REPORT 2018

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

REPORT 2018

Institute of Fundamental Technological Research
Polish Academy of Sciences
Warsaw, Poland

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Contents

Bureau: Officers and Members **1**
Secretariat **1**
Past Officers **1**
Past Congress Presidents **2**
Adhering Organizations **4**
Affiliated Organizations **13**
Members of the General Assembly **18**
Observers to the General Assembly **21**
Members of the Congress Committee **22**
Members of the Symposia Panels **23**
Donations in 2018 ..... **23**
IUTAM Representation in ISC and its Scientific Committees **23**
Reports of the IUTAM Symposia held in 2018 ..... **24**
18-1 IUTAM Symposium on Recent Advances in Moving Boundary Problems in Mechanics 24
18-2 IUTAM Symposium on Dynamics and Stability of Fluid Interfaces 30
18-3 IUTAM Symposium on Motile Cells in Complex Environments 35
18-4 IUTAM Symposium on Model Order Reduction of Coupled Systems (MORCOS 2018) 41
18-5 IUTAM Symposium on Size-Effects in Microstructure and Damage Evolution 47
18-6 IUTAM Symposium on Acoustic/Elastic Metamaterials, Their Design and Applications 52
18-7 IUTAM Symposium on Critical Flow Dynamics Involving Moving/Deformable Structures with Design Applications 56
18-8 IUTAM Symposium on Mechanical Environments of Living Cells 64
18-9 IUTAM Symposium on Exploiting Nonlinear Dynamics for Engineering Systems (ENOLIDES 2018) 67
18-10 IUTAM Symposium on Mechanical Design and Analysis for AM Technologies (AMT 2018) 72
18-11 IUTAM Symposium on Mechanics of Electro/Magneto-Active Materials and Structures 77
18-12 IUTAM Symposium on Stochastic Dynamical Systems Approaches to Fluid Flow Transitions 83
18-13 IUTAM Symposium on Architectured Material Mechanics 86
18-14 IUTAM Symposium on When Topology Optimization Meets Additive Manufacturing – Theory and Methods 94
18-15 IUTAM Symposium on Dynamics of Complex Fluids and Interfaces 101
Summary Record of the General Assembly Meeting 2018 ..... **108**
2018 Treasurer's Report **129**
Reports on Affiliated Organizations **134**
AFMC (Asian Fluid Mechanics Committee) 134

BICTAM (Beijing International Center for Theoretical and Applied Mechanics) 134
CISM (International Centre for Mechanical Sciences) 136
EUROMECH (European Mechanics Society) 138
HYDROMAG (International Association for Hydromagnetic Phenomena and Applications) 140
IABEM (International Association for Boundary Element Methods) 141
IACM (International Association for Computational Mechanics) 141
IASCM (International Association for Structural Control and Monitoring) 142
IAVSD (International Association for Vehicle Systems Dynamics) 143
ICA (International Commission for Acoustics) 144
ICF (International Congress on Fracture) 147
ICHMT (International Centre for Heat and Mass Transfer) 148
ICM (International Conference on the Mechanical Behaviour of Materials) 150
ICR (International Committee on Rheology) 150
ICTS (International Congresses on Thermal Stresses) 151
IIAV (International Institute of Acoustics and Vibration) 151
IMSD (International Association of Multibody System Dynamics) 152
ISIMM (International Society for the Interaction of Mechanics and Mathematics) 153
ISSMO (International Society for Structural and Multidisciplinary Optimization) 154
LACCOTAM (Latin American & Caribbean Congress of Theoretical and Applied Mechanics) 155
WCB (World Council of Biomechanics) 155
Reports on ISC and its Scientific Committees 157
ISC (International Science Council) 157
CODATA (Committee on Data) 160
COSPAR (Committee on Space Research) 162
SCOR (Scientific Committee on Oceanic Research) 162
Statutes 163
Statuts de l'Union Internationale de Mécanique Théorique et Appliquée 163
Règles de fonctionnement du Comité des Congrès de l'Union 169
Règles pour l'élection du Bureau de l'IUTAM 170
Règles pour l'élection de Membres Cooptés par l'Assemblée Générale 171
Statutes of the International Union of Theoretical and Applied Mechanics 172
Rules of procedure for the Congress Committee (CC) of IUTAM 177
Procedure for election of the Bureau of IUTAM 178
Procedure for electing Members-at-Large of the General Assembly 179
List of Publications 181
Proceedings of IUTAM Symposia 182
Proceedings of the International Congresses on Theoretical and Applied Mechanics (ICTAM) 191
Publications on the history of IUTAM 195

Bureau: Officers and Members

The following members of the Bureau of IUTAM have been elected for the period 1 November 2016 to 31 October 2020:

Officers	
Professor N. Aubry (USA)	President
Professor V. Tvergaard (Denmark)	Vice-President
Professor P. Eberhard (Germany)	Treasurer
Professor H. Petryk (Poland)	Secretary-General

Members	
Professor N.A. Fleck (UK)	(elected 2016)
Professor A.P.S. Freire (Brazil)	(elected 2016)
Professor I.G. Goryacheva (Russia)	(elected 2016)
Professor B.A. Schrefler (Italy)	(elected 2012)

Secretariat

IUTAM-Secretariat, Institute of Fundamental Technological Research,
Polish Academy of Sciences, Pawińskiego 5B, 02-106 Warsaw, Poland
Telephone: +48 22 826 98 34
E-mail: IUTAM.Petryk@ippt.pan.pl
Internet: http://www.iutam.org

Past Officers

Elected	*President*	*Vice-President*	*Treasurer*	*Secretary*
1948	J. Péres (France)	R.V. Southwell (UK)	H.L. Dryden (USA)	J.M. Burgers (Netherlands)
1952	H.L. Dryden (USA)	J. Péres (France)	G. Temple (UK)	F.A. v. d. Dungen (Belgium)
1956	F.K.G. Odqvist (Sweden)	H.L. Dryden (USA)	G. Temple (UK)	M. Roy (France)
1960	G. Temple (UK)	F.K.G. Odqvist (Sweden)	W.T. Koiter (Netherlands)	M. Roy (France)
1964	M. Roy (France)	G. Temple (UK)	W.T. Koiter (Netherlands)	H. Görtler (Germany)
1968	W.T. Koiter (Netherlands)	M. Roy (France)	H. Görtler (Germany)	F.I. Niordson (Denmark)
1972	H. Görtler (Germany)	W.T. Koiter (Netherlands)	D.C. Drucker (USA)	F.I. Niordson (Denmark)

1976	F.I. Niordson (Denmark)	H. Görtler (Germany)	D.C. Drucker (USA)	J. Hult (Sweden)
1980	D.C. Drucker (USA)	F.I. Niordson (Denmark)	E. Becker (Germany)	J. Hult (Sweden)
1984	J. Lighthill (UK)	D.C. Drucker (USA)	L.v. Wijngaarden (Netherlands)	W. Schiehlen (Germany)
1988	P. Germain (France)	J. Lighthill (UK)	L.v. Wijngaarden (Netherlands)	W. Schiehlen (Germany)
1992	L.v. Wijngaarden (Netherlands)	P. Germain (France)	B.A. Boley (USA)	F. Ziegler (Austria)
1996	W. Schiehlen (Germany)	L.v. Wijngaarden (Netherlands)	L.B. Freund (USA)	M.A. Hayes (Ireland)
2000	H.K. Moffatt (UK)	W. Schiehlen (Germany)	L.B. Freund (USA)	D.H. van Campen (Netherlands)
2004	L.B. Freund (USA)	H.K. Moffatt (UK)	J. Engelbrecht (Estonia)	D.H. van Campen (Netherlands)
2008	T.J. Pedley (UK)	L.B. Freund (USA)	N. Olhoff (Denmark)	F. Dias (France)
2012	V. Tvergaard (Denmark)	T.J. Pedley (UK)	P. Eberhard (Germany)	F. Dias (Ireland)

Past Congress Presidents

Nr.	*Year*	*Place*	*Congress-President*
1	1924	Delft, The Netherlands	C.B. Biezeno
2	1926	Zürich, Switzerland	E. Meissner
3	1930	Stockholm, Sweden	A.F. Enström
4	1934	Cambridge, UK	C.E. Inglis
5	1938	Cambridge, USA	K.T. Compton
6	1946	Paris, France	H. Villat
7	1948	London, UK	R.V. Southwell
8	1952	Istanbul, Turkey	K. Erim
9	1956	Brussels, Belgium	F.H. van den Dungen
10	1960	Stresa, Italy	G. Colonnetti
11	1964	Munich, Germany	H. Görtler
12	1968	Stanford, USA	N.J. Hoff
13	1972	Moscow, USSR	N.I. Muskhelishvili
14	1976	Delft, The Netherlands	W.T. Koiter
15	1980	Toronto, Canada	F.P.J. Rimrott
16	1984	Lyngby, Denmark	F. Niordson
17	1988	Grenoble, France	P. Germain and M. Piau
18	1992	Haifa, Israel	J. Singer
19	1996	Kyoto, Japan	T. Tatsumi

20	2000	Chicago, USA	H. Aref
21	2004	Warsaw, Poland	W. Gutkowski
22	2008	Adelaide, Australia	E. Tuck
23	2012	Beijing, China	Y. Bai
24	2016	Montréal, Canada	J.M. Floryan

Adhering Organizations

Armenia (2016) ***(Associate Organization)***
Armenian National Committee on Theoretical and Applied Mechanics
24B Marshall Baghramyan Ave., 0019 Yerevan
President/Chair: Prof. A. (Ara) Avetisyan
Representative in IUTAM: Prof. A.V. (Avetik) Sahakyan

Australia (1964)
The Australian National Committee for Mechanical and Engineering Sciences of the Australian Academy of Science
GPO Box 783, Canberra City, ACT 2601
President/Chair: Prof. M. (Mark) Bradford
Representatives in IUTAM: Prof. M. (Mark) Bradford, Prof. J.E. (John) Sader

Austria (1951)
Austrian National Committee for Theoretical and Applied Mechanics of the Austrian Academy of Sciences
Dr.-Ignaz-Seipel-Platz 2, A-1010 Wien
President/Chair: Prof. M. (Manfred) Kaltenbacher
Contact: Prof. F. (Franz) Rammerstorfer
Representative in IUTAM: Prof. A. (Alfred) Kluwick

Belgium (1949)
The National Committee for Theoretical and Applied Mechanics of the Royal Academies for Science and Arts of Belgium
Hertogsstraat 1 rue Ducale, B-1000 Brussels
President/Chair: Prof. P. (Patrick) Guillaume
Contact: Prof. W. (Walter) Bosschaerts
Representatives in IUTAM: Prof. W. (Wim) Desmet, Prof. P. (Patrick) Guillaume, Prof. D.V.H. (Dirk) Vandepitte

Brazil (1982)
Associação Brasileira de Engenharia e Ciências Mecânicas – ABCM
Avenida Rio Branco 124/18° andar, 20040-001 Rio de Janeiro
President/Chair: Prof. G. (Gherhardt) Ribatski
Contact: Prof. A.P.S. (Atila) Freire
Representatives in IUTAM: Prof. J.B.R. (Juliana) Loureiro, Prof. M.A.F. (Marcello) de Medeiros

Bulgaria (1969)
Bulgarian National Committee on Theoretical and Applied Mechanics of the Bulgarian Academy of Sciences
1, 15 novembre str., BG-1040 Sofia
President/Chair: Prof. S. (Stefan) Radev
Representative in IUTAM: Prof. S. (Stefan) Radev

Canada (1963)
The National Research Council of Canada, Canadian National Committee for IUTAM
1200 Montreal Road, Building M-50, Ottawa, Ontario K1A OR6
President/Chair: Prof. S. (Suresh) Shrivastava
Secretary: Prof. J.M. (Maciej) Floryan
Representatives in IUTAM: Prof. S. (Sadik) Dost, Prof. J.M. (Maciej) Floryan, Prof. M. (Marilyn) Lightstone, Prof. S. (Suresh) Shrivastava

Chile (1996)
The Chile National Committee on Theoretical and Applied Mechanics
Academia Chilena de Ciencias
Almirante Montt 454, Santiago
President/Chair: Dr. J. (Juan) Asenjo
Secretary: Dr. F. (Francisco) Hervé
Contact: Prof. F. (Fernando) Lund
Representatives in IUTAM: Prof. F. (Fernando) Lund

China (1980)
The Chinese Society of Theoretical and Applied Mechanics
15 Beisihuanxi Road, 100190 Beijing
President/Chair: Prof. W. (Wei) Yang
Secretary: Prof. Y. (Yazheng) Yang
Contact: Mr. J. (Jie) Chen
Representatives in IUTAM: Prof. H.Y. (Haiyan) Hu, Prof. J. (Jiachun) Li, Prof. T.J. (Tianjian) Lu, Prof. W. (Wei) Yang, Prof. X.J. (Xiaojing) Zheng

China-Hong Kong (1996)
The Hong Kong Society of Theoretical and Applied Mechanics (HKSTAM)
Department of Mechanical Engineering, City University of Hong Kong
83 Tat Chee Avenue, Kowloon Tong, Hong Kong
President/Chair: Prof. L. (Li) Cheng
Secretary: Prof. Z.-Q. (Zhong-Qing) Su
Representative in IUTAM: Prof. Q.-P. (Qing-Ping) Sun

China-Taipei (1980)
The Society of Theoretical and Applied Mechanics
Department of Mechanical Engineering, National Tsing Hua University
101 Kuang-Fu Road, 30013 Hsinchu
President/Chair: Prof. K.-N. (KuoNing) Chiang
Secretary: Y.-B. (Yu-Bin) Chen
Contact: Y.-B. (Yu-Bin) Chen
Representatives in IUTAM: Prof. C.-C. (Chien-Cheng) Chang,
Prof. W.-C. (Wei-Chung) Wang

Croatia (1994)
Croatian Society of Mechanics
Ivana Lucica 5, HR-10000 Zagreb
President/Chair: Prof. Dr-Ing L. (Lovre) Krstulovic-Opara
Contact: Prof. G. (Goran) Turkalj
Representative in IUTAM: Prof. G. (Goran) Turkalj

Cyprus (2010) ***(Associate Organization)***
Cyprus Mathematical Society
36 Stanisou street, Office 102, Strovolos 2003, Nicosia
President/Chair: Prof. G. (Gregory) Makrides
Contact: Prof. Y.-S. (Yiorgos-Sokratis) Smyrlis
Representative in IUTAM: Prof. P. (Paul) Christodoulides

Czech Republic (2018/1949)
Czech Society for Mechanics
Dolejškova 5, CZ-18200 Prague 8
President/Chair: Prof. J. (Jindrich) Petruska
Secretary: Dr. J. (Jiri) Naprstek
Contact: Prof. M. (Miloslav) Okrouhlík
Representative in IUTAM: Prof. M. (Miloslav) Okrouhlík

Denmark (1949)
National Committee for Theoretical & Applied Mechanics
The Royal Danish Academy of Sciences and Letters
H.C. Andersens Boulevard 35, DK-1553 Copenhagen V.
President/Chair: Prof. T. (Tom) Fenchel
Secretary: Prof. H. (Henrik) Breuning-Madsen
Contact: Prof. C. (Christian) Niordson, Prof. J.N. (Jens Nørkær) Sørensen
Representatives in IUTAM: Prof. C. (Christian) Niordson,
Prof. J.N. (Jens Nørkær) Sørensen

Egypt (1976)
Academy of Scientific Research and Technology
Egyptian Committee of Theoretical and Applied Mechanics
101 Kasr El Eini Street, 11516 Cairo
President/Chair: Prof. M. (Mahmoud) Sakar
Contact: Prof. S. (Sameh) Soror, Dr. O. (Osama) Marzouk
Representative in IUTAM: Prof. M.K. (Mohamed) Ismail

Estonia (1992)
Estonian Committee for Mechanics
Akadeemia tee 21, EE-12618 Tallinn
President/Chair: Prof. A. (Andrus) Salupere
Representative in IUTAM: Prof. A. (Andrus) Salupere

Finland (1952)
The Finnish National Committee on Mechanics
Aalto University, Attent. Prof. Juha Paavola, P.O.Box 12100, FIN-00076 Aalto
President/Chair: Prof. J. (Juha) Paavola
Secretary: Prof. R. (Reijo) Kouhia
Contact: Prof. J. (Juha) Paavola
Representatives in IUTAM: Prof. R. (Reijo) Kouhia, Prof. J. (Juha) Paavola

France (1949)
Comité National Français de Mécanique, Académie des Sciences
23, quai Conti, F-75006 Paris
President/Chair: Prof. P. (Pierre) Suquet
Secretary: Prof. J. (Jacques) Magnaudet
Representatives in IUTAM: Prof. S. (Samuel) Forest, Prof. P. (Patrick) Huerre, Prof. D. (Djimedo) Kondo, Prof. S. (Stéphane) Popinet

Georgia (2000)
Georgian National Committee of Theoretical and Applied Mechanics
I. Vekua Institute of Applied Mathematics of Iv. Javakhishvili Tbilisi State University
2 University Str., 0186 Tbilisi
President/Chair: Prof. G. (George) Jaiani
Representative in IUTAM: Prof. G. (George) Jaiani

Germany (1950)
Gesellschaft für angewandte Mathematik und Mechanik/Deutsches Komitee für Mechanik (GAMM/DEKOMECH)
Clausthal University of Technology, Institute of Applied Mechanics, Adolph-Roemer-Str. 2a, D-38678 Clausthal-Zellerfeld
President/Chair: Prof. S. (Stefan) Hartmann
Representatives in IUTAM: Prof. B. (Bruno) Eckhardt, Prof. S. (Stefan) Hartmann, Prof. J. (Jörg) Schumacher, Prof. R. (Robert) Seifried

Greece (1979)
Hellenic Society for Theoretical and Applied Mechanics
National Technical University of Athens, Mechanics Division
Zographou Campus, GR-15773, Athens
President/Chair: Prof. J.T. (John) Katsikadelis
Secretary: Prof. H.G. (Haralambos) Georgiadis
Representative in IUTAM: Prof. N. (Nicos) Makris

Hungary (1948)
Hungarian National Committee for IUTAM
Department of Applied Mechanics, Budapest University of Technology and Economics
Müegyetem rkp. 3, H-1521 Budapest
President/Chair: Prof. G. (Gábor) Stépán
Secretary: Dr. P. (Peter) Varkonyi
Representative in IUTAM: Prof. G. (Gábor) Stépán

India (1950)
National Committee for Theoretical and Applied Mechanics of the Indian National Science Academy
Bahadur Shah Zafar Marg, 110 002 New Delhi
President/Chair: Prof. V.D. Sharma
Contact: Prof. S. Gopalakrishnan
Representatives in IUTAM: Prof. S. (Santosh) Kapuria, Prof. S. (Sanjay) Mittal, Prof. G.P. Rajasekhar

Ireland (1984)
Irish National Committee for Mathematical Sciences
Royal Irish Academy, 19 Dawson Street, Dublin 2
Contact: Y. (Yvonne) Graham
Representative in IUTAM: Prof. M.D. (Michael) Gilchrist

Israel (1950)
The Israel Society for Theoretical and Applied Mechanics (ISTAM)
Faculty of Mechanical Engineering, Technion-Israel Institute of Technology
32000 Haifa
President/Chair: Prof. G. (Gal) deBotton
Contact: Prof. M.B. (Miles) Rubin
Representatives in IUTAM: Prof. G. (Gal) deBotton, Prof. M.B. (Miles) Rubin

Italy (1949)
Associazione Italiana di Meccanica Teorica ed Applicata
Piazza Leonardo da Vinci 32, I-20133 Milano
President/Chair: Prof. S. (Stefano) Lenci
Secretary: Prof. W. (Walter) d'Ambrogio
Contact: Prof. S. (Stefano) Lenci
Representatives in IUTAM: Prof. D. (Davide) Bigoni, Prof. A. (Alessandro) Bottaro, Prof. E.F. (Emiliano Fortunato) Campana, Prof. G. (Giuseppe) Rega

Japan (1951)
The National Committee for Theoretical and Applied Mechanics
Science Council of Japan, 7- 22-34 Roppongi, Minato-ku, Tokyo 106-8555
President/Chair: Prof. K. (Koichi) Hishida
Secretary: Prof. M. (Masaharu) Kameda
Contact: Prof. K. (Kikuo) Kishimoto
Representatives in IUTAM: Prof. K. (Koichi) Hishida, Prof. K. (Kikuo) Kishimoto, Prof. N. (Naoshi) Nishimura, Prof. O. (Osamu) Sano

Korea, Republic of (2012/1989)
Korean Committee for Theoretical and Applied Mechanics
c/o The Korean Society of Mechanical Engineers
Room 702, KSTC New Bld., 635-4, Yeogsam-dong, Kangnam-ku, 135-703 Seoul
President/Chair: Prof. J.Y. (Jung Yul) Yoo
Contact: Prof. S.J. (Sang Joon) Lee
Representative in IUTAM: Prof. H.J. (Hyung Jin) Sung

Mexico (2008)
Mexican Academy of Sciences
Km 23.5 Carretera Federal México-Cuernavaca, "Casa Tlalpan", Av. Cipreses s/n Col. San Andrés Totoltepec, Tlalpan, 14400 Mexico
Representative in IUTAM: Prof. E. (Eduardo) Ramos

Netherlands (1952)
Netherlands Mechanics Committee
c/o Eindhoven University of Technology, Department of Mechanical Engineering
P.O. Box 513, NL 5600 MB Eindhoven
President/Chair: Prof. G.J.F. (GertJan) van Heijst
Secretary: Prof. D.H. (Dick) van Campen
Representatives in IUTAM: Prof. G.J.F. (GertJan) van Heijst, Prof. P. (Patrick) Onck

New Zealand (1979)
The Royal Society of New Zealand
Committee on Mathematical & Information Sciences
P.O. Box 598, Wellington 6140
Contact: Prof. R. (Rosalind) Archer
Representative in IUTAM: Prof. R. (Rosalind) Archer

Norway (1949)
National Committee on Theoretical and Applied Mechanics
Norwegian Acad. Sciences and Letters, Dept. of Maths, University of Oslo
P.O. Box 1053, Blindern, N-0316 Oslo 3
President/Chair: Prof. J. (John) Grue
Contact: Prof. J. (John) Grue
Representative in IUTAM: Prof. J. (John) Grue

Poland (1952)
Committee for Mechanics of the Polish Academy of Sciences
ul. Pawinskiego 5B, 02-106 Warsaw
President/Chair: Prof. T. (Tadeusz) Burczynski
Contact: Prof. T. (Tadeusz) Burczynski
Representatives in IUTAM: Prof. T. (Tadeusz) Burczynski, Prof. H. (Henryk) Petryk

Portugal (1968)
Portuguese Society of Theoretical, Applied and Computational Mechanics
Laboratorio Nacional de Engenharia Civil, Avenida do Brasil 101, 1700-066 Lisboa
President/Chair: Prof. J. (Jose) Cesar de Sa
Contact: Prof. C.A.B. (Carlos) Pina
Representative in IUTAM: Prof. D.R.Z. (Dinar) Camotim

Romania (1956)
Romanian Academy, Department of Mathematics
Romanian National Committee of Theoretical and Applied Mechanics
Calea Victoriei 125, 71102 Bucharest
President/Chair: Prof. H. (Horia) Ene
Representative in IUTAM: Prof. H. (Horia) Ene

Russia (1992/1956)
Russian National Committee on Theoretical and Applied Mechanics
Prospekt Vernadskogo 101 : 1, Moscow 119526
President/Chair: Prof. I.G. (Irina) Goryacheva
Secretary: Prof. V. (Vladimir) Karev
Representatives in IUTAM: Prof. F.L. (Felix) Chernousko, Prof. I.G. (Irina) Goryacheva, Prof. V.A. (Vladimir) Levin, Prof. N.F. (Nikita) Morozov

Saudi Arabia (1988)
King Abdulaziz City for Science and Technology
Directorate of Technology and International Cooperation
P.O. Box 6086, Riyadh 11442
President/Chair: Dr. M.I. (Mohammed ibn Ibrahim) Al-Suwaiyel
Contact: Mr. F.S. (Fahad) Huraib, Dr. M.I. (Mohammed ibn Ibrahim) Al-Suwaiyel
Representative in IUTAM: Dr. M.I. (Mohammed ibn Ibrahim) Al-Suwaiyel

Serbia (2006/1952)
Serbian Society of Mechanics
Kneza Milosa 9/1, 11000 Belgrade
President/Chair: Prof. M. (Mihailo) Lazarevic
Secretary: Prof. D. (Damir) Madjarevic
Representative in IUTAM: Prof. M. (Mihailo) Lazarevic

Slovenia (1994)
Slovene Mechanics Society
Faculty of Mechanical Engineering, University of Maribor
Smetanova 17, 2000 Maribor
President/Chair: Prof. D. (Dejan) Zupan
Secretary: Prof. J. (Jure) Marn
Representative in IUTAM: Prof. D. (Dejan) Zupan

South Africa (1994)
National Research Foundation (NRF)
South African Association for Theoretical and Applied Mechanics (SAAM)
South African ICSU Secretariat, P.O. Box 2600, Pretoria 0001
President/Chair: Dr. S. (Sebastian) Skatulla
Contact: Dr. S. (Sebastian) Skatulla
Representative in IUTAM: Dr. S. (Sebastian) Skatulla

Spain (2018/1950)
Sociedad Española de Mecánica Teórica y Aplicada (SEMTA)
ETSI, Camino de los descubrimientos s/n, 41092, Sevilla
President/Chair: Prof. P. (Pilar) Ariza
Representative in IUTAM: Prof. P. (Pilar) Ariza

Sweden (1950)
Swedish National Committee for Mechanics
Lund University, Avdelning för Hållfasthetslära, Box 118, SE-22100 Lund
President/Chair: Prof. A. (Anders) Klarbring
Secretary: Prof. H. (Hakan) Hallberg
Representatives in IUTAM: Prof. D. (Dan) Henningson, Prof. S. (Staffan) Lundström, Prof. P. (Per) Stahle

Switzerland (1950)
Board of the Federal Institutes of Technology
(Rat der Eidgenössischen Technischen Hochschulen)
ETH-Zentrum, CH-8092 Zürich
President/Chair: Dr. F. (Fritz) Schiesser
Contact: Prof. J. (Jürg) Dual, Prof. P.A. (Peter) Monkewitz
Representatives in IUTAM: Prof. J. (Jürg) Dual, Prof. P.A. (Peter) Monkewitz

Turkey (1977)
Turkish National Committee of Theoretical and Applied Mechanics
Istanbul Teknik Üniversitesi, Fen-Edebiyat Fakültesi, Maslak 80626, Istanbul
Secretary: Prof. M.A. (Mehmet Ali) Tasdemir
Contact: Prof. E.S. (Erdogan) Suhubi
Representative in IUTAM: Prof. E.S. (Erdogan) Suhubi

UK (1948)
The Royal Society, UK Panel for IUTAM
6 Carlton House Terrace, London SW1Y 5AG
President/Chair: Prof. N.A. (Norman) Fleck
Secretary: Prof. R. (Rich) Kerswell
Representatives in IUTAM: Prof. A. (Alan) Cocks, Prof. N.A. (Norman) Fleck,
Prof. A. (Anne) Juel, Prof. R. (Rich) Kerswell

Ukraine (1995)
National Committee of Ukraine on Theoretical and Applied Mechanics
S.P.Timoshenko Institute of Mechanics, 3 Nesterov Str., Kyiv 03680
President/Chair: Prof. A.N. (Alexandr) Guz
Secretary: Prof. J.J. (Jeremiah) Rushchitsky
Representative in IUTAM: Prof. A.N. (Alexandr) Guz

USA (1949)
The U.S. National Committee on Theoretical and Applied Mechanics
The National Academies, 500 Fifth Street NW, Washington, DC 20001
President/Chair: Prof. G. (Gareth) McKinley
Secretary: Prof. L. (Linda) Franzoni
Representatives in IUTAM: Prof. W. (Wendy) Crone, Prof. L. (Linda) Franzoni,
Prof. S. (Stelios) Kyriakides, Prof. W.K. (Wing Kam) Liu, Prof. G. (Gareth) McKinley

Viet Nam (1990)
Vietnamese Association of Mechanics (VAM)
Hoi Co Hoc Vietnam, 264 Doi Can, Hanoi
President/Chair: Prof. N. (Nguyen) Tien Khiem
Secretary: Prof. T. (Tran) Van Lien
Contact: Prof. H. (Hung) Nguyen-Xuan
Representative in IUTAM: Prof. H. (Hung) Nguyen-Xuan

Affiliated Organizations

CISM (1970)
International Centre for Mechanical Sciences
Palazzo del Torso, Piazza Garibaldi, I-33100 Udine, Italy
Rectors of CISM: Prof. Elisabeth Guazzelli,
Prof. Franz G. Rammerstorfer and Prof. Wolfgang A. Wall
President/Chair: Mario Pezzetta
Secretary: Prof. B.A. (Bernhard) Schrefler
Contact: Prof. B.A. (Bernhard) Schrefler
Representative of CISM in IUTAM: Prof. B.A. (Bernhard) Schrefler
Representative of IUTAM in CISM: Prof. F. (Frédéric) Dias

ICHMT (1972)
International Centre for Heat and Mass Transfer
Mechanical Engineering Department E-104, Middle East Technical University, Dumlupınar Bulvarı No:1, 06800 Çankaya Ankara, Turkey
President/Chair: Prof. K. (Kemal) Hanjalić
Secretary: Prof. F. (Faruk) Arinc
Contact: Prof. F. (Faruk) Arinc
Representative of ICHMT in IUTAM: Prof. F. (Faruk) Arinc
Representative of IUTAM in ICHMT: Dr. R. (Rudolf) Dvorák

ICR (1974)
International Committee on Rheology
President/Chair: Prof. H. (Hiroshi) Watanabe
Secretary: Prof. G. (Gerald) Fuller
Contact: Prof. G. (Gerald) Fuller
Representative of ICR in IUTAM: Prof. L.G. (Gary) Leal
Representative of IUTAM in ICR: Prof. G. (Gareth) McKinley

IAVSD (1977)
International Association for Vehicle System Dynamics
Institute of Mechanics and Mechatronics, TU Wien, Getreidemarkt 9, 1060, Vienna, Austria
President/Chair: Prof. T. (Tim) Gordon
Secretary: Prof. M. (Manfred) Plöchl
Representative of IAVSD in IUTAM: Prof. M. (Mats) Berg
Representative of IUTAM in IAVSD: Prof. R. (Robert) Seifried

EUROMECH (1978)
European Mechanics Society
Institut de Mécanique des Fluides de Toulouse, Allée du Professeur Camille Soula, 31400 Toulouse, France
President/Chair: Prof. G.J.F. (GertJan) van Heijst
Secretary: Prof. J. (Jacques) Magnaudet
Representative of EUROMECH in IUTAM: Prof. P. (Patrick) Huerre
Representative of IUTAM in EUROMECH: Prof. N.A. (Norman) Fleck

ISIMM (1978)
International Society for the Interaction of Mechanics and Mathematics
President/Chair: Prof. G. (Giuseppe) Saccomandi
Secretary: Prof. G. (Giuseppe) Tomassetti
Representative of ISIMM in IUTAM: Prof. A. (Alain) Goriely
Representative of IUTAM in ISIMM: Prof. F.L. (Felix) Chernousko

ICF (1978)
International Congress on Fracture
Research Institute for Strength and Fracture of Materials, Tohoku University, Sendai, Japan
President/Chair: Prof. R.M. (Robert) McMeeking
Secretary: Prof. A.T. (Toshimitsu) Yokobori, Jr.
Representative of ICF in IUTAM: Prof. L. (Leslie) Banks-Sills
Representative of IUTAM in ICF: Prof. J.B. (Jean-Baptiste) Leblond

ICM (1982)
International Conference on the Mechanical Behaviour of Materials,
President/Chair: Prof. D. (Detlef) Löhe
Secretary: Prof. Y. (Yoshihiko) Uematsu
Representative of ICM in IUTAM: Prof. S.W. (Soo Woo) Nam
Representative of IUTAM in ICM: *To be nominated*

AFMC (1982)
Asian Fluid Mechanics Committee
Center for Atmospheric and Oceanic Sciences
Indian Institute of Science, 560012 Bangalore, India
President/Chair: Prof. G.S. (Ganapati Shankar) Bhat
Representative of AFMC in IUTAM: Prof. G.S. (Ganapati Shankar) Bhat
Representative of IUTAM in AFMC: Prof. F. (Frédéric) Dias

IACM (1984)
International Association for Computational Mechanics
International Center for Numerical Methods in Engineering,
Edificio C-1, Gran Capitán s/n, E-08034 Barcelona, Spain
President/Chair: Prof. W.K. (Wing Kam) Liu
Secretary: Prof. A. (Antonio) Huerta
Representative of IACM in IUTAM: Prof. P. (Pierre) Ladevèze
Representative of IUTAM in IACM: Prof. R. (Eduardo) de Arantes e Oliveira

CACOFD (1992-2010)
Caribbean Congress of Fluid Dynamics
(the acronym CACOFD has been changed into LACCOTAM in 2010 – see LACCOTAM below)

IABEM (1994)
International Association for Boundary Element Methods
President/Chair: Prof. N. (Naoshi) Nishimura
Representative of IABEM in IUTAM: Prof. N. (Naoshi) Nishimura
Representative of IUTAM in IABEM: Prof. N. (Naoshi) Nishimura

ISSMO (1996)
International Society for Structural and Multidisciplinary Optimization
Civil Engineering Department, Johns Hopkins University, 3400 N. Charles St., MD 21218 Baltimore**,** USA
President/Chair: Prof. G. (Gengdong) Cheng
Secretary: Prof. J.K. (James) Guest
Contact: Prof. N. (Niels) Olhoff
Representative of ISSMO in IUTAM: Prof. J.K. (James) Guest
Representative of IUTAM in ISSMO: Prof. N. (Niels) Olhoff

HYDROMAG (1996)
International Association for Hydromagnetic Phenomena and Applications
Applied Mathematics Research Centre, Coventry University,
Priory Street, Coventry, CV1 5FB, UK
President/Chair: Prof. A. (Alban) Pothérat
Contact: Prof. A. (Alban) Pothérat
Representative of HYDROMAG in IUTAM: Prof. A. (Alban) Pothérat
Representative of IUTAM in HYDROMAG: Prof. H.K. (Keith) Moffatt

IIAV (1997)
International Institute of Acoustics and Vibration
Dept. of Mechanical Engineering, Auburn University,
201 Ross Hall, Auburn, AL 36849 USA
President/Chair: Prof. E. (Eleonora) Carletti
Secretary: Mr. R.M. (Rupert) Thornely-Taylor
Contact: Prof. M.J. (Malcolm) Crocker
Representative of IIAV in IUTAM: Prof. M.J. (Malcolm) Crocker
Representative of IUTAM in IIAV: Prof. J.D. (Jan) Achenbach

ICA (1998)
International Commission for Acoustics
President/Chair: Prof. M. (Michael) Taroudakis
Secretary: Dr. M. (Michael) Stinson
Contact: Dr. M. (Michael) Stinson
Representative of ICA in IUTAM: Prof. A. (Andrew) Norris
Representative of IUTAM in ICA: Prof. A. (Andrew) Norris

ICTS (2002)
International Congresses on Thermal Stresses
St. Raphael, Apt. 1209, 7117 Pelican Bay Blvd., Naples, Fl 34108, USA
President/Chair: Prof. R.B. (Richard) Hetnarski
Secretary: Prof. T.R. (Theodore) Tauchert
Contact: Prof. R.B. (Richard) Hetnarski
Representative of ICTS in IUTAM: Prof. R.B. (Richard) Hetnarski
Representative of IUTAM in ICTS: Prof. M. (Masato) Abe

BICTAM (2010)
Beijing International Center for Theoretical and Applied Mechanics
Institute of Mechanics, Chinese Academy of Sciences,
15 Beisihuanxi Road, 100190 Beijing, China
President/Chair: Prof. J. (Jiachun) Li
President/Chair: Prof. W. (Wei) Yang
Representative of BICTAM in IUTAM: Prof. W. (Wei) Yang
Representative of IUTAM in BICTAM: Prof. N. (Narinder) Gupta

LACCOTAM (2010)
Latin American and Caribbean Conference on Theoretical and Applied Mechanics
The Department of Math and Computer Science, The University of the West Indies, St. Augustine, Trinidad, West Indies
President/Chair: Prof. H. (Harold) Ramkissoon
Secretary: Dr. D. (Donna) Comissiong
Contact: Prof. H. (Harold) Ramkissoon
Representative of LACCOTAM in IUTAM: Dr. S.R. (Sreedhara Rao) Gunakala
Representative of IUTAM in LACCOTAM: Prof. A.P.S. (Atila) Freire

IASCM (2014)
International Association for Structural Control and Monitoring
President/Chair: Prof. H. (Hui) Li
Secretary: Prof. S. (Sami) Masri
Representative of IASCM in IUTAM: Prof. S. (Sami) Masri
Representative of IUTAM in IASCM: Prof. R. (Robert) Seifried

IMSD (2014)
International Association for Multibody System Dynamics
President/Chair: Prof. J. (Jorge) Ambrosio
Secretary: Prof. J. (Javier) Cuadrado
Representative of IMSD in IUTAM: Prof. P. (Peter) Eberhard
Representative of IUTAM in IMSD: Prof. W. (Werner) Schiehlen

WCB (2016)
World Council of Biomechanics
President/Chair: Prof. P. (Peter) Hunter
Secretary: Prof. L. (Lynne) Bilston
Representative of WCB in IUTAM: Prof. P. (Peter) Hunter
Representative of IUTAM in WCB: Prof. T.J. (Timothy) Pedley

Members of the General Assembly

Member	***Representative of***	***Remarks***
Prof. J.D. (Jan) Achenbach		Member-at-Large
Dr. M.I. (Mohammed ibn Ibrahim) Al-Suwaiyel	Saudi Arabia	
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Prof. Y. (Yilong) Bai		Member-at-Large
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Prof. A. (Alessandro) Bottaro	Italy	
Prof. M. (Mark) Bradford	Australia	
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Prof. D.R.Z. (Dinar) Camotim	Portugal	
Prof. E.F. (Emiliano Fortunato) Campana	Italy	
Prof. C.-C.(Chien Cheng) Chang	China-Tapei	
Prof. F.L. (Felix) Chernousko	Russia	
Prof. P. (Paul) Christodoulides	Cyprus	*Observer*
Prof. A. (Alan) Cocks	UK	
Prof. W. (Wendy) Crone	USA	
Prof. G. (Gal) deBotton	Israel	
Prof. W. (Wim) Desmet	Belgium	
Prof. S. (Sadik) Dost	Canada	
Prof. J. (Jürg) Dual	Switzerland	
Prof. P. (Peter) Eberhard		Bureau member Representative of IMSD
Prof. B. (Bruno) Eckhardt	Germany	
Prof. H. (Horia) Ene	Romania	
Prof. N.A. (Norman) Fleck	UK	Bureau member
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Prof. S. (Samuel) Forest	France	
Prof. L. (Linda) Franzoni	USA	
Prof. A.P.S. (Atila) Freire		Bureau member
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Prof. P. (Patrick) Guillaume	Belgium	
Prof. A.N. (Alexandr) Guz	Ukraine	
Prof. S. (Stefan) Hartmann	Germany	

Member	*Representative of*	*Remarks*
Prof. G.J.F. (GertJan) van Heijst	Netherlands	
Prof. D. (Dan) Henningson	Sweden	
Prof. K. (Koichi) Hishida	Japan	
Prof. H.Y. (Haiyan) Hu	China	
Prof. P. (Patrick) Huerre	France	Representative of EUROMECH
Prof. M.K. (Mohamed) Ismail	Egypt	
Prof. G. (George) Jaiani	Georgia	
Prof. A. (Anne) Juel	UK	
Prof. S. (Santosh) Kapuria	India	
Prof. R. (Rich) Kerswell	UK	
Prof. K. (Kikuo) Kishimoto	Japan	
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Prof. D. (Djimedo) Kondo	France	
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Prof. S. (Stelios) Kyriakides	USA	
Prof. M. (Mihailo) Lazarevic	Serbia	
Prof. V.A. (Vladimir) Levin	Russia	
Prof. J. (Jiachun) Li	China	
Prof. M. (Marilyn) Lightstone	Canada	
Prof. W.K. (Wing Kam) Liu	USA	
Prof. D. (Detlef) Lohse		Chair SP Fluids
Prof. J.B.R. (Juliana) Loureiro	Brazil	
Prof. T.J. (Tianjian) Lu	China	
Prof. F. (Fernando) Lund	Chile	
Prof. S. (Staffan) Lundström	Sweden	
Prof. G. (Giulio) Maier		Member-at-Large
Prof. N. (Nicos) Makris	Greece	
Prof. G. (Gareth) McKinley	USA	
Prof. R.M. (Robert) McMeeking		Secretary CC
Prof. M.A.F. (Marcello) de Medeiros	Brazil	
Prof. S. (Sanjay) Mittal	India	
Prof. H.K. (Keith) Moffatt		Member-at-Large
Prof. P.A. (Peter) Monkewitz	Switzerland	
Prof. N.F. (Nikita) Morozov	Russia	
Prof. R. (Roddam) Narasimha		Member-at-Large
Prof. H. (Hung) Nguyen-Xuan	Viet Nam	
Prof. C. (Christian) Niordson	Denmark	
Prof. N. (Naoshi) Nishimura	Japan	Representative of IABEM
Prof. M. (Miloslav) Okrouhlík	Czech Republic	
Prof. N. (Niels) Olhoff		Member-at-Large

Member	***Representative of***	***Remarks***
Prof. P. (Patrick) Onck	Netherlands	
Prof. J. (Juha) Paavola	Finland	
Prof. T.J. (Timothy) Pedley		Member-at-Large
Prof. H. (Henryk) Petryk	Poland	Bureau member
Prof. S. (Stéphane) Popinet	France	
Prof. S. (Stefan) Radev	Bulgaria	
Prof. G.P. (G.P.) Rajasekhar	India	
Prof. E. (Eduardo) Ramos	Mexico	
Prof. G. (Giuseppe) Rega	Italy	
Prof. M.B. (Miles) Rubin	Israel	
Prof. J.E. (John) Sader	Australia	
Prof. A.V. (Avetik) Sahakyan	Armenia	*Observer*
Prof. J. (Jean) Salençon		Member-at-Large
Prof. A. (Andrus) Salupere	Estonia	
Prof. O. (Osamu) Sano	Japan	
Prof. W. (Werner) Schiehlen		Member-at-Large
Prof. B.A. (Bernhard) Schrefler		Bureau member Representative of CISM
Prof. J. (Jörg) Schumacher	Germany	
Prof. R. (Robert) Seifried	Germany	
Prof. S. (Suresh) Shrivastava	Canada	
Dr. S. (Sebastian) Skatulla	South Africa	
Prof. P. (Per) Stahle	Sweden	
Prof. G. (Gábor) Stépán	Hungary	
Prof. E.S. (Erdogan) Suhubi	Turkey	
Prof. Q.-P. (Qing-Ping) Sun	China-Hong Kong	
Prof. H.J. (Hyung Jin) Sung	Republic of Korea	
Prof. J.N. (Jens Nørkær) Sørensen	Denmark	
Prof. T. (Tomomasa) Tatsumi		Member-at-Large
Prof. G. (Goran) Turkalj	Croatia	
Prof. V. (Viggo) Tvergaard		Bureau member
Prof. D.V.H. (Dirk) Vandepitte	Belgium	
Prof. W.-C. (Wei-Chung) Wang	China-Taipei	
Prof. L. (Leen) van Wijngaarden		Member-at-Large
Prof. W. (Wei) Yang	China	Representative of BICTAM
Prof. X.J. (Xiaojing) Zheng	China	
Prof. D. (Dejan) Zupan	Slovenia	

Observers to the General Assembly

Name	*Country*	*Representative of*
Prof. F. (Faruk) Arinc	Turkey	ICHMT
Prof. L. (Leslie) Banks-Sills	Israel	ICF
Prof. M. (Mats) Berg	Sweden	IAVSD
Prof. G.S. (Ganapati Shankar) Bhat	India	AFMC
Prof. M.J. (Malcolm) Crocker	USA	IIAV
Prof. A. (Alain) Goriely	UK	ISIMM
Prof. J.K. (James) Guest	USA	ISSMO
Dr. S.R. (Sreedhara Rao) Gunakala	Trinidad & Tobago	LACCOTAM
Prof. R.B. (Richard) Hetnarski	USA	ICTS
Prof. P. (Peter) Hunter	New Zealand	WCB
Prof. P. (Pierre) Ladevèze	France	IACM
Prof. L.G. (Gary) Leal	USA	ICR
Prof. S. (Sami) Masri	USA	IASCM
Prof. S.W. (Soo Woo) Nam	Republic of Korea	ICM
Prof. A. (Andrew) Norris	USA	ICA
Prof. A. (Alban) Pothérat	UK	HYDROMAG

Members of the Congress Committee

*Year indicates end of term

Member	***Country***	***Year****	***Remarks***
Prof. P. (Pilar) Ariza	Spain	2020	
Prof. N. (Nadine) Aubry	USA	2020	President of XCCC
Prof. L. (Leslie) Banks-Sills	Israel	2020	Member of XCCC
Prof. D. (Davide) Bigoni	Italy	2022	
Prof. S. (Shiyi) Chen	China	2020	
Prof. A. (Alan) Cocks	UK	2022	
Prof. A. (Alberto) Corigliano	Italy	2020	Member of XCCC
Prof. A. (Anne) De Wit	Belgium	2022	
Prof. B. (Bruno) Eckhardt	Germany	2020	Member of XCCC
Prof. H. (Horacio) Espinosa	USA	2020	
Prof. J.M. (Maciej) Floryan	Canada	2020	
Prof. H. (Huajian) Gao	USA	2020	
Prof. M.D. (Michael) Gilchrist	Ireland	2022	
Prof. P. (Patrick) Huerre	France	2020	
Prof. P. (Peter) Hunter	New Zealand	2020	
Prof. A. (Anne) Juel	UK	2022	
Prof. A. (Ann) Karagozian	USA	2020	
Prof. D. (Djimedo) Kondo	France	2020	
Prof. P.F. (Paul) Linden	UK	2022	
Prof. D. (Detlef) Lohse	Netherlands	2022	
Prof. T.J. (Tianjian) Lu	China	2020	
Prof. J. (Jacques) Magnaudet	France	2020	Member of XCCC
Prof. V. (Valery) Matveenko	Russia	2020	
Prof. R.M. (Robert) McMeeking	USA	2020	Secretary of XCCC
Prof. S. (Sanjay) Mittal	India	2022	
Prof. H. (Henryk) Petryk	Poland	2020	
Prof. M.V. (Maria Vittoria) Salvetti	Italy	2020	
Prof. E.S.G. (Eric) Shaqfeh	USA	2020	
Prof. G. (Gábor) Stépán	Hungary	2020	Member of XCCC
Prof. S. (Shu) Takagi	Japan	2022	
Prof. J. (Jens) Walther	Denmark	2020	
Prof. W.-C. (Wei-Chung) Wang	China-Taipei	2022	
Prof. J.X. (Jianxiang) Wang	China	2022	
Prof. H. (Hiroshi) Yabuno	Japan	2020	

Members of the Symposia Panels

In 1977 the Bureau of IUTAM set up two panels charged with the duty of scanning proposals made for IUTAM Symposia in the fields of fluid and solid mechanics. In 1992 that duty was extended to include scanning of proposals for IUTAM Summer Schools.

Symposia Panel for Fluid Mechanics:			
Member	***Country***	***Year****	***Remarks***
Prof. R. (Rama) Govindarajan	India	2022	
Prof. E. (Elisabeth) Guazzelli	France	2020	
Prof. A. (Ann) Karagozian	USA	2022	
Prof. H. (Hua) Liu	China	2020	
Prof. D. (Detlef) Lohse	Netherlands	2020	Chair
Symposia Panel for Solid Mechanics			
Member	***Country***	***Year****	***Remarks***
Prof. L. (Leslie) Banks-Sills	Israel	2022	
Prof. A. (Alexander) Belyaev	Russia	2020	
Prof. H. (Huajian) Gao	USA	2020	Chair
Prof. J.-B. (Jean-Baptiste) Leblond	France	2020	
Prof. T.J. (Tianjian) Lu	China	2022	

*Year indicates end of term

Donations in 2018

Donations given to IUTAM Symposia are recorded under the heading “Financial Support” of the Reports of Symposia held in 2018.

IUTAM Representation in ISC and its Scientific Committees

Acronym	*Organization/Scientific Committee*	*Representative of IUTAM*
ISC	International Science Council	Prof. N. Aubry
CODATA	Committee on Data	Prof. F. Chinesta
COSPAR	Committee on Space Research	Prof. G. Ravichandran
SCOR	Scientific Committee on Oceanic Research	*To be nominated*

Reports of the IUTAM Symposia held in 2018

18-1 IUTAM Symposium on Recent Advances in Moving Boundary Problems in Mechanics

Christchurch, New Zealand, February 12 – February 15, 2018

a) Scientific Committee

Symposium Co-Chair: Stefanie Gutschmidt, University of Canterbury, New Zealand
Symposium Co-Chair: Mathieu Sellier, University of Canterbury, New Zealand

Members:
Jim Denier, Macquarie University, Sydney
J Maciej Floryan, Western University, Canada
Peter Hagedorn, TU Darmstadt, Germany
Oliver Jensen, University of Manchester, United Kingdom
Timothy Myers, Centre de Recerca Matematica, Spain
Stephane Popinet, National Centre of Scientific Research, France
IUTAM Representative:
Peter Eberhard, Universität Stuttgart, Germany

See https://iutam2018.nz/committees/ for other committees and information.

b) Short summary of scientific progress achieved

The aims of this symposium were to:

1. gather the international community of engineers and scientists involved in moving boundary problems in mechanics
2. attract a broad spectrum of researchers from various backgrounds (theoretician, numerical analysists, experimentalist, applied mathematicians, engineers, physicists, etc …)
3. unify a fragmented community to cross-fertilize ideas

The organization of the symposium started very shortly after being awarded the IUTAM grant late in 2016. We formed the scientific and organizing committees (see https://iutam2018.nz/committees/ for committees) and prepared a substantial list of more than 200 potential participants. Invitations to submit an abstract were sent and the symposium was advertised on relevant fora such as (ANZIAM – Australia and New Zealand Industrial and Applied Mathematics, AFMS - Australasian Fluid Mechanics Society, GAMM - Gesellschaft für Angewandte Mathematik und Mechanik, ECMI - European Consortium for Mathematics in Industry, CFD online, Australia Mathematics Society). The committees then assessed around 50 abstracts of which one was rejected. Few were sent back for minor corrections. Given the remoteness of New Zealand, the pool of potential participants was smaller than it

would have been in Europe or North America but we took great care of not compromising quality while at the same time attracting a sufficient number of researchers. We secured support from the University of Canterbury (in kind) and small financial support from COMSOL Multiphysics.

We had 48 registered participants in total from 17 different countries, a truly international cross-section of the field of interest. Only a small fraction of the participants was local. We organized the symposium over 4 days in a single stream to maximize researchers' interaction and facilitate cross-fertilization of ideas. The program and book of abstracts are available as supplementary documents. The symposium took place in brand new facilities in the College of Engineering at the University of Canterbury. Talks were broadly organized in themes: fluid-structure interaction, bioengineering applications, multiphase flows, analytical and numerical methods, Stefan problems, Structures with a moving boundary, Optimization. Each speaker had 20 minutes in total for presentation and we did not organize a poster session. Engagement from participants was generally very good with discussions extending well into the various breaks.

We invited four plenary speakers: Prof Yvonne Stokes (University of Adelaide), Prof Scott McCue (Queensland University of Technology), Prof Jun Zhang (NYU), Prof Frederic Dias (University College Dublin). The unanimous feedback we have received is that all plenary talks were of very high standard and very stimulating. The symposium had a good mix of participants (65% Engineering, 31% Applied mathematics, 4% Physics). Presentations also spanned the whole spectrum from theory to applications. Most of the talks were oriented towards fluid mechanics (approximately 40% fluid, 40% fluid/structure interaction, 20% solid).

Overall, we are happy to report that we feel like we have met the initial stated objectives of this meeting and that the symposium was a success. We have certainly received much very positive, informal feedback.

c) Countries represented and number of participants

We had 48 registered participants in total from 17 different countries, a truly international cross-section of the field of interest. Only a small fraction of the participants was local. Participants had affiliation in New Zealand, Australia, China, South Korea, India, Singapore, Japan, France, Germany, Poland, Austria, Italy, UK, Ireland, USA, Canada, and Russia.

d) Publication of Proceedings of the Symposium

Proceedings of the symposium have been published as Volume 34 of the IUTAM Bookseries by Springer.

e) Financial support

The grant from IUTAM has been used to cover the printing costs, travel costs for plenary speakers, registration fees for a small number of students.

f) Scientific program

Monday, February 12

Venue: E5, Engineering Core

08:30 - 09:30 Registration

09:30 - 10:00 Opening Address

10:00 - 11:00 Keynote: *Symmetry breaking bifurcations arising from fluid-structure interaction*, Presenter: Jun Zhang, Author(s): Zhang J

11:00 - 11:30 Tea Break

Morning Session (Chair: Mark Jermy)

11:30 - 11:50 *Aerodynamical and structural analysis of operationally used turbine blades*, Presenter: Jörg Wallaschek, Author(s): Schwerdt L, Hauptmann T, Kunin A, Seume JR, Wallaschek J, Wriggers P, Panning-von Scheidt L, Löhnert S

11:50 - 12:10 *Modelling free flying insect with flexible wings*, Presenter: Yang Yao, Author(s): Yeo KS, Yao Y, Nguyen TT, Yao J

12:10 - 12:30 *Three-dimensional flight simulation with transient moving-aerofoil models*, Presenter: Arion Pons, Author(s): Pons A, Cirak F

12:30 - 12:50 *Coupling post-buckling oscillations and fluid flow: swimming at the micron scale*, Presenter: Catherine Quilliet, Author(s): Djellouli A, Quilliet C, Djeridi H, Marmottant P, Coupier G

12:50 - 14:20 Lunch

Afternoon Session (Chair: Rosalind Archer)

14:20 - 14:40 *Vortex shedding and flow-induced vibration of multiple cylinders in tandem*, Presenter: Negar Mohammadhosseini, Author(s): Mohammadhosseini N, Griffith MD, Leontini JS

14:40 - 15:00 *Flow-induced vibration of fully- and semi-passive flapping foils*, Presenter: Justin S. Leontini, Author(s): Leontini JS, Griffith MD, Jacono DL, Sheridan J

15:00 - 15:20 *Computational modelling of sheep forestomach contractions using OpenFOAM*, Presenter: Stephen J. Waite, Author(s): Waite SJ, Cater JE, Waghorn G, Suresh V

15:20 - 15:40 *Temperature control in skin sonoporation setup*, Presenter: Jeremy Robertson, Author(s): Robertson J, Becker S

15:40 - 16:10 Tea Break

16:10 - 16:30 *Mixing efficiency in arrays of artificial villi*, Presenter: Aaron Fishman, Author(s): Fishman A, Homer M, Lawrie A, Rossiter J

16:30 - 16:50 *CFD reconstruction of blood hemodynamic based on a self-made algorithm in patients with acute IIIb aortic dissection treated with*

TEVAR procedure, Presenter: Andrej Polanczyk, Author(s): Polanczyk A, Piechota-Polanczyk A, Neumayer C, Huk I

16:50 - 17:10 *Structures subject to movable boundary conditions and some related intriguing behaviour*, Presenter: Francesco Dal Corso, Author(s): Dal Corso F, Misseroni D, Bigoni D

Venue: Staff Club, Ilam Homestead, 87 Ilam Rd, Ilam

18:00 - 20:30 Reception

Tuesday, February 13

Venue: E5, Engineering Core

08:30 - 09:30 Registration

09:00 - 10:00 Keynote: *Can we fabricate that fiber?*, Presenter: Yvonne M. Stokes, Author(s): Stokes YM

Morning Session (Chair: Miguel Moyers Gonzalez)

10:00 - 10:20 *A level-set method for droplet motion in a porous medium*, Presenter: Gihun Son, Author(s): Yu H, Son G

10:20 - 10:40 *The three dynamical regimes of a droplet driven by thermocapillarity*, Presenter: Mathieu Sellier, Author(s): MacIntyre JR, Gomba JM, Perazzo CA, Correa PG, Sellier M

10:40 - 11:10 Tea Break

11:10 - 11:30 *Simulation of the ultrasound-induced growth and collapse of a near-wall bubble*, Presenter: Bradley Boyd, Author(s): Boyd B, Becker S

11:30 - 11:50 *Modelling of dynamic free-surface impacts using a combined Eulerian Lagrangian finite element approach*, Presenter: Tom Allen, Author(s): Allen T, Cummins H, Robb A, Battley M, McArthur B, Li K-Y

11:50 - 12:10 *Air flow entrainment of lactose powder: simulation and experiment*, Presenter: Digby Symons, Author(s): Kopsch T, Murnane D, Symons D

12:10 - 12:30 *Lamella puncture and healing after droplet impact*, Presenter: Hossein Rashidian, Author(s): Rashidian H, Sellier M

12:30 - 14:00 Lunch

Afternoon Session (Chair: Peter Hagedorn)

14:00 - 14:20 *On the stability of free-boundary problems: a case study in vortex dynamics*, Presenter: Bartosz Protas, Author(s): Protas B

14:20 - 14:40 *A one-field fictitious domain method for fluid-structure interactions*, Presenter: Yongxing Wang, Author(s): Wang Y, Jimack PK, Walkley MA

14:40 - 15:00 *Numerical simulation in coupled hydroelastic problems by using the LS-STAG immersed boundary method*, Presenter: Ilia K. Marchevsky, Author(s): Marchevsky IK, Puzikova VV

15:00 - 15:20 *The improved algorithms of vortex method for 2D fluid-structure interaction simulation*, Presenter: Kseniia S Kuzmina, Author(s): Kuzminz KS, Marchevsky IK
15:20 - 15:50 Tea Break
15:50 - 16:10 *A geometry-adaptive immersed boundary-lattice Boltzmann method for modelling fluid-structure interaction problems*, Presenter: Fang-Bao Tian, Author(s): Xu L, Tian F-B, Young J, Lai JCS
16:10 - 16:30 *Immersed boundary-lattice Boltzmann method for solving moving boundary problems*, Presenter: Barsharat Ali Haider, Author(s): Haider BA, Adeeb E, Sohn CH
16:30 - 16:50 *Toward the problem of low RE flows through linearly elastic porous media*, Presenter: Sid Becker, Author(s): Becker S
Venue: Curator's House, 7 Rolleston Ave, Christchurch Central
18:00 Bus departures from Creyke Rd (Engineering Core)
18:30 - 19:00 Drinks & Social Interaction
19:00 - 21:30 Dinner

Wednesday, February 14
Venue: E5, Engineering Core
08:30 - 09:00 Registration
09:00 - 10:00 Keynote: *Three dimensional linear and nonlinear surface wave patterns*, Presenter: Scott W. McCue, Author(s): McCue SW, Pethiyagoda R, Moroney TJ
Morning Session (Chair: Mathieu Sellier)
10:00 - 10:20 *Approximate analytical solution of the one phase Stefan problem for the sphere*, Presenter: Robert B. Shorten, Author(s): Shorten RB
10:20 - 10:40 *Selection criterion of stable mode of dendritic growth with n-fold symmetry at arbitrary Péclet numbers in the presence of a forced convective flow*, Presenter: Dimitri V. Alexandrov, Author(s): Alexandrov DV, Galenko PK
10:40 - 11:10 Tea Break
11:10 - 11:30 *Riemann-Hilbert problems to link flow-driven erosion, dissolution and melting*, Presenter: M. Nicholas J. Moore, Author(s): Moore MNJ
11:30 - 11:50 *Evolution of a melting solid sphere of ice in cross-flow*, Presenter: James N. Hewett, Author(s): Hewett JN, Sellier M
12:10 - 20:00 Excursion to Akaroa
Depart Engineering Core at 12:15
15:40 - 17:40 Akaroa Harbor Nature Cruise
20:00 - 21:30 Return to Christchurch by bus

Thursday, February 15

Venue: E5, Engineering Core

08:30 - 09:00 Registration

09:00 - 10:00 Keynote: *Recent advances in slamming*, Presenter: Frédéric Dias, Author(s): Dias F

Morning Session (Chair: Stefanie Gutschmidt)

10:00 - 10:20 *The moving boundary problem of a semi-infinite cable resting on a unilateral foundation*, Presenter: Stefano Lenci, Author(s): Lenci S

10:20 - 10:40 *Analysis of 3D crack boundary value problems by means of the enriched scaled boundary finite element method*, Presenter: Wilfried Becker, Author(s): Hell S, Felger J, Becker W

10:40 - 11:10 Tea Break

11:10 - 11:30 *Analysis of dynamic variable mass and variable parameter systems applying semi-analytical time-integration*, Presenter: Helmut J. Holl, Author(s): Holl HJ

11:30 - 11:50 *Equipartition of modal energy in a vibrating string due to a finite curved boundary obstacle*, Presenter: Pankaj Wahi, Author(s): Mandal AK, Wahi P

11:50 - 12:10 *The FEM for a loaded column with harmonic axial forcing using a large number of solid elements*, Presenter: Eoin J. Clerkin, Author(s): Reiken M, Clerkin EJ

12:10 - 12:30 *Fluid-dynamic effects of non-neighboring members in an array*, Presenter: Arun Kumar Manickavasagam, Author(s): Manickavasagam AK, Wagner N, Gutschmidt S, Sellier M

12:30 - 14:00 Lunch

Afternoon Session (Chair: Sid Becker)

14:00 - 14:20 *Shape optimization approach to inverse problems in corrosion detection from partial Cauchy data*, Presenter: Julius Fergy T. Rabago, Author(s): Rabago JFT, Azegami H

14:20 - 14:40 *Optimal hydrodynamic vibration damper with an inner moving mass*, Presenter: Alexander Fidlin, Author(s): Jehle G, Fidlin A

14:40 - 15:00 *Viscosity of printable concrete via extrusion head*, Presenter: Yong Yuan, Author(s): Yuan Y, Tao Y

15:00 - 15:10 Closing Remarks

Report composed by Stefanie Gutschmidt and Mathieu Sellier

18-2 IUTAM Symposium on Dynamics and Stability of Fluid Interfaces
Gainesville, USA, April 2 – April 5, 2018

Symposium organizer: Ranga Narayanan, University of Florida, USA

a) Scientific Committee
Paul Steen, Cornell University, USA; Olivier Desjardins (chair), Cornell University, USA; Stéphane Zaleski, Université Pierre et Marie Curie, France; Nikolaus Adams, Technische Universität München, Germany; Alex Oron, Technion, Israel; Serafim Kalliadaisis, Imperial College London, UK; Viswanathan Kumaran, Indian Institute of Science, India; Nadine Aubry (IUTAM Representative), Northeastern University, USA

b) Short summary of the progress achieved
b.1) Short summary of the theme
Dynamics of interfaces between fluids and fluids/solids are common in natural and engineered flows. Two-phase flows are key to processes including additive manufacturing, printing, coating, fuel combustion, pipeline transport, nuclear cooling, concentrated solar power, aircraft de-icing, and food preservation, among many others. Break-up, coalescence and capillary reconfiguration of interfaces are often crucial features of simulating two-phase flow.

On the simulation side, major advances have been made using level set, volume of fluid, and phase-field methods in the past ten years. For all these techniques, robust, conservative, and converging simulations in 2D and 3D have been demonstrated, and physics-based handling of contact line dynamics are now becoming commonplace and accurate solutions from first principles are obtained. Yet, the cost of such simulations - while dropping rapidly - remains high, and therefore their usefulness remains limited. In addition, because the microscale physics of topology changes and contact line dynamics take place below grid resolution, obtaining grid-independent simulation results becomes a formidable challenge. Systematically embedding reliable reduced-order models to represent sub-grid scale flow physics would reduce computational cost and provide a clear path towards mesh-independent handling of solutions.

On the modeling side, nonlinear phenomena can now be addressed by tools that include weakly nonlinear analysis, long-wave theory, energy methods and reduced-order methods. Bifurcation approaches yield accurate dynamics and evolution well beyond linear instability. For rapid advancement in mechanistic understanding of such complex processes, the modeling effort is best complemented with first-principle simulation data. Conversely, simulations can benefit greatly from the integration of reliable reduced-order models to capture complex flow physics without requiring resolution of all scales.

The aim of the symposium is to bring computational and modeling experts together to address major issues in fluid interfaces and contact-lines from the two perspectives of simulation and modeling. The speakers will represent a diverse group of applied physicists, applied mathematicians and engineers.

b.2) Short summary of the progress made

The meeting focused on two major aspects of stability of fluid interfaces and their stability. The first was on low dimensional modeling and the second was on numerics. The former was itself focused on thin film dynamics, rupture, and behavior in the vicinity where Van der Waals forces are dominant. Problems associated with sliding films, electrostatic films, phase change instabilities and electro-hydrodynamics were discussed. In each of these papers the points being made was that low dimensional modeling, that is the use of long wavelength theories to various degrees of approximation were able to capture a major part of the essential physics. In some cases these points were fortified with experiments and in others they were compared with full numerical simulations. Of great interest was the Weighted Residual Integrated Boundary Layer Model. The low dimensional models were also applied to problems with soft or complaint boundaries. Full numerics done on the latter were able to reveal transitions to turbulence.

Several talks using Volume of Fluid were given and some with Spectral methods. Problems associated with interface tracking, numerical stability and convergence were discussed. The main outcome was that certain methods such as level set methods were equally efficacious as Volume of Fluid methods. In a round table discussion it was pointed out that an extremely useful way to proceed for a large class of problems was to use low dimensional modeling aa a means of capturing the first order physics. One of the meeting highlights were short presentations by students.

c) Countries represented and number of participants

The following countries were represented: United Kingdom, United States, France, Germany, India, Turkey.
Total speakers: 21 main speakers and 8 short student presentations
Total participants including speakers and other attendees: 48

d) Publication of proceedings of the Symposium

None are planned. The abstracts were uploaded on the website and continue to be at the URL: https://pire.che.ufl.edu/iutam_abstract/

e) Financial support

Financial support was received from several sources and all were acknowledged at the IUTAM meeting.
1) French Embassy for Participants from France ($3000)
2) National Science Foundation for US based students and post docs. ($10,000)

3) University of Florida for Conference facilities ($3000)
4) IUTAM (used for non-US participants other than those who came from France) ($5000)

f) Scientific program (Speaker's name is underlined)

Monday, April 2

4:15 – 4:30 PM Welcome by Dr. Narayanan

4:30 – 5:05 PM *3D Large-Scale Level-Set Simulations of Flows with Moving Contact Lines Coupled with Analysis*
Peter D. M. Spelt, Zlatko Solomenko and Julian Scott
Laboratoire de Mécanique des Fluides et d'Acoustique (LMFA), CNRS, University of Lyon, Ecully, France

5:15 – 5:50 PM *Interface Dynamics and Entrainment in Turbidity Currents*
S. Balachandar[1], J. Salinas[1,2], M. Cantero[2]
[1]University of Florida,
[2]Instituto Balseiro, Universidad Nacional de Cuyo

5:50 – 6:05 PM *Collisional Dissipation Rate of Flexible Rods Measured using Driven and Non- Driven DEM Simulations*
Kevin E. Buettner, Liliana Bello, Yu Guo, Jennifer S. Curtis
Chemical Engineering, University of Florida

6:05 – 6:20 PM *Euler-Lagrange Point-Particle Simulation with Fully-Resolved Physics with Pairwise Interaction Extended Point-Particle (PIEP) Model*
Kai Liu, Chandler Moore, David Zwick and S. Balachandar
Department of Mechanical & Aerospace Engineering, University of Florida

6:20 onward Dinner Reception

Tuesday, April 3

8:45 – 9:20 AM *Instabilities in Thin Inhomogeneous Fluid Sheets*
Siddarth Srinivasan, Harvard University

9:25 – 10:00 AM *Computational Studies of Dynamic Heterogeneous Fluid Systems*
Gretar Tryggvason, Jiacai Lu and Alberto Román Afanador
John Hopkins University

10:05 – 10:40 AM *Electrostatic Faraday Instability in thin films*
Dipin S. Pillai, University of Florida

10:45 – 11:20 AM *Intensification of Heat Transfer across a Falling Liquid Film*
Nicolas Cellier and Christian Ruyer-Quil, Laboratoire FAST

11:20 – 11:45 AM Q&A / Coffee Break

11:45 – 12:00 PM *Electrostatically Forced Faraday Instability: Theory, Experiments and Measurements*
Kevin Ward[1,2], Satoshi Matsumoto[3] and Ranga Narayanan[1]
[1]University of Florida, [2]University of Lille, France, [3]Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency

12:00 – 1:20 PM Lunch

1:30 – 2:05 PM *Direct Numerical Simulation of Complex Turbulent Flows*

Stéphane Zaleski, Institut Jean Le Rond ∂'Alembert, CNRS and Sorbonne Universités, France

2:10 – 2:45 PM *Nonlinear Mechano-Chemical Oscillations in a Model Actomyosin Cortex*
Jason R. Picardo, K. Vijay Kumar
International Center for Theoretical Sciences, TIFR, Bengaluru, India

2:50 – 3:25 PM *On Sub-Grid Modeling for Simulation of Moving Contact Lines*
Dominique Legendre, Institut de Mécanique des Fluides de Toulouse (IMFT), Université de Toulouse, CNRS, INPT, UPS, Toulouse, France.

3:30 – 4:05 PM *Effect of Wall Corrugations on Scalar Transfer to a Wavy Falling Liquid Film*
Georg F. Dietze, Laboratoire FAST

4:05 – 4:30 PM Q&A / Coffee Break

4:30 – 4:45 PM *Brownian Dynamics Simulations of Magnetic Nanoparticles Captured in Strong Magnetic Field Gradients*
Zhiyuan Zhao, Isaac Torres-Díaz, Camilo Vélez, David Arnold and Carlos Rinaldi, University of Florida

4:45 – 5:00 PM *Shear-Induced Dynamics of Rigid Fibers in an Oscillatory Pipe Flow*
Scott Strednak[1,2], Saif Shaikh[1,2], Élisabeth Guazzelli[2], and Jason E. Butler[1,2]
[1]Chemical Engineering, University of Florida
[2]Aix-Marseille Université, CNRS, IUSTI UMR 7343, 13453 Marseille France

5:00 – 5:15 PM *High-Quality Experiments of Explosive Dispersal of Particles*
Kyle Hughes, S. Balachander, University of Florida

5:15 – 5:45 PM Round up by Dr. Steen / Desjardins

Wednesday, April 4

8:45 – 9:20 AM *Complexity on all Scales in Interfacial Hydrodynamics: Discrete Self-Similarity and Formation of Iterated Patterns*
Dmitri Tseluiko, Michael Dallaston, Zhong Zheng, Marco Fontelos Serafim Kalliadasis, Imperial College, U.K.

9:25 – 10:00 AM *Mechanisms of Dynamic Wetting Failure in the Presence of Soluble Surfactants*
C.-Y. Liu[1], M. S. Carvalho[2] and S. Kumar[1]
[1]University of Minnesota, USA
[2]Department of Mechanical Engineering, Pontificia Universidade Católica do Rio de Janeiro, Brazil

10:05 – 10:40 AM *Eigenvalue Collisions and Oscillatory Instability of a Heated Liquid Film*
W. Batson, D. Shirokoff, L. Cummings and L. Kondic
NJIT, Newark, New Jersey

10:45 – 11:20 AM *Instabilities in the Flow past a Soft Surface*

V. Kumaran, Department of Chemical Engineering, Indian Institute of Science, India

11:20 – 11:45 AM Q&A / Coffee Break

11:45 – 12:00 PM *DNA Concentration due to Migration under Parallel Fields*
Ryan J. Montes, Anthony J. C. Ladd and Jason E. Butler
University of Florida, Gainesville, USA

12:00 – 1:20 PM Lunch

1:30 – 2:05 PM *The Fluid Dynamics of Anti-Surfactant Solutions*
Stephen K. Wilson, University of Strathclyde, Glasgow, Scotland, UK

2:10 – 2:45 PM *A Volume-of-Fluid Dual-Scale Approach for Large Eddy Simulation of Turbulent Liquid/Gas Interfaces*
Dominic Kedelty, James Uglietta and Marcus Herrmann
Arizona State University

2:50 – 3:25 PM *Electrohydrodynamic Instabilities in Microchannels*
Kerem Uguz, Department of Chemical Engineering, Bogazici University, Istanbul, Turkey

3:30 – 4:05 PM *Dynamics and Stability of a Liquid-Gas Interface in the Presence of Microparticles*
Farzam Zoueshtiagh, University of Lille, CNRS, France

4:05 – 4:30 PM Q&A / Coffee Break

4:30 – 5:05 PM *A Fundamental Approach to Modelling Multiphase Flows*
O. K. Matar and L. Mason
Department of Chemical Engineering, Imperial College London, SW7 2AZ, UK

5:10 – 5:25 PM *An Analytical Approach for Predicting Complex Instabilities of Exploding Spherical/Cylindrical Interfaces*
Paul Crittenden, University of Florida

5:30 – 6:00 PM Round up by Dr. Narayanan / Desjardins

6:15 onward Banquet Dinner

Thursday, April 5

9:00 – 9:35 AM *Influence of Thermal Effects on Stability of Nanoscale Films and Filaments on Thermally Conductive Substrates*
Lou Kondic, Ivana Seric, Shahriar Afkhami
NJIT, Newark, New Jersey

9:40 – 10:15 AM *Droplet Breakup as Multi-Scale Computing Challenge*
Stefan Adami and Nikolaus K. Adams
Technische Universität München, Munich, Bayern, Germany

10:15 – 10:50 AM *Challenges in the Simulation of Spray Formation*
Mario F. Trujillo, Department of Mechanical Engineering, University of Wisconsin-Madison

10:55 – 11:30 AM Q&A and Closeout

11:30 onward Lunch

Report composed by Ranga Narayanan

18-3 IUTAM Symposium on Motile Cells in Complex Environments
Udine, Italy, May 15 – May 18, 2018

Website: http://158.110.32.35/IUTAM2018/

Organizers:
Eric Climent, IMFT Toulouse (FRA)
Cristian Marchioli, University of Udine (ITA)

a) Scientific Committee
Arezoo Ardekani, Purdue University (USA)
Rachel Bearon, University of Liverpool (UK)
Eric Climent, IMFT Toulouse (FRA)
Ignacio Pagonabarraga, University of Barcelona (SPA)
Roman Stocker, ETH zurich (SUI)
Ganesh Subramanian, Jawaharlal Nehru Centre for Advanced Scientific (IND)
Roland G. Winkler, Institute for Advanced Simulation, Forschungszentrum Julich (GER)
IUTAM Representative: Prefessor Bernhard Schrefler, University of Padova (Italy)

b) Short summary of scientific progress achieved
Cell motility is a multi-faceted interdisciplinary challenge for a wide community of scientists in physics, applied mathematics, chemistry, biology, life sciences and engineering with applications ranging from medical to bio-technological and environmental issues. Cells often grow and move within complex fluid environments: examples include motile phytoplankton cells giving rise to bio-convective patterns in turbulent flows, but also suspensions of swimming bacteria that can form biofilms under adverse conditions and swarm to colonize solid surfaces. Depending on the targeted biological system, such environments may be characterized both by high and low Reynolds numbers thus involving a broad spectrum of spatial and temporal dynamics.

The Symposium brought together internationally renowned scientists from all horizons (analytical, numerical and experimental) and definitely fostered scientific exchange and strengthen interdisciplinary work among engineers, applied mathematicians, physicists and biologists. A wide selection of topics was covered, from single swimmer propulsion and navigation mechanisms to synchronized and collective motion, focusing on how active cells may use hydrodynamic interaction and biochemistry to coordinate their locomotion. Also covered were the dynamics and rheology of active fluids, fluid-structure interactions in bio-inspired systems, growth of tissues and surface colonization. The interest on these topics has exploded in the last decade, as demonstrated by the wealth of experimental or numerical results that

have been produced and by the many resulting (sometimes competing) theories that have been developed. The Symposium gave the opportunity to compare and contrast the different available approaches, giving a global overview of the most significant advancements in the field. It provided a nice summary of the state-of-the-art methodological aspects in experiment and simulation, helping in the identification of the main open issues and research pathways that the community should focus on in the future.

During the Symposium, lively discussions were held on:

- Biological nano and micro-swimmers: a significant number of contributions have provided a broad overview of different classes of biological swimmers on the nano- and macro-scale, from sperm cells to bacteria and algae, examining the different propulsion mechanisms and navigation strategies (based on the use of cilia or flagella) and the underlying principles and communication strategies (e.g. chemotaxis and phototaxis).
- Swarming: several contributions examined how active agents are able to self-organize in a spontaneous way, resulting in coordinated and collective motions. Examples that were discussed are swarming bacteria, surfacing plankton, and the cytoskeleton of cells.
- Cell dynamics and locomotion: other contributions have addressed the fundamental biological processes that require collective cell motions resulting from groups of cells that exhibit collective behavior by virtue of motility and cell-cell interaction. Among the processes that were discussed: cytoskeleton-generated forces to deform the cell body, inter-cellular and substrate adhesion, fingering-like instabilities and spreading, glass-like arrest induced by mature cellular adhesions.

c) Countries represented and number of participants

47 participants from 12 countries (1 from Australia, 1 from Austria, 1 from China, 4 from France, 6 from Germany, 2 from India, 10 from Italy, 2 from Spain, 2 from Sweden, 1 from Switzerland, 13 from United Kingdom, 4 from United States) attended the Symposium.

d) Publication of Proceedings of the Symposium

None (but the electronic copy of the 2-page abstracts can be downloaded for free from the Symposium website).

e) Financial support

5,000 USD from IUTAM, 3,000 EUR from University of Udine, 3,000 EUR from CINECA.

f) Scientific Program

Tuesday, May 15

17:00 - 19:00 Welcome buffet and registration

Wednesday, May 16

8:30 - 9:00 On-site registration

9:00 - 9:15 Welcome Address

9:15 - 10:00 *Gyrotactic phytoplankton swimming in laminar and turbulent flows*
G. Boffetta, M. Cencini. F. De Lillo

10:00 - 10:30 *Enhanced sedimentation of elongated plankton in simple flows*
W. Clifton, R.N. Bearon, M.A. Bees

10:30 - 11:00 Coffee Break

11:00 - 11:18 *Gyrotactic trapping can be hydrodynamically unstable*
S. Maretvadakethope, E. Keaveny, Y. Hwang

11:18 - 11:36 *Colonization of moving marine aggregates by bacteria*
K. Guseva, U. Feudel

11:36 - 11:54 *Flow navigation by smart microswimmers via reinforcement learning*
S. Colabrese, K. Gustavsson, A. Celani, L. Biferale

11:54 - 12:12 *Vertical migration of motile phytoplankton chains through turbulence*
E. Climent, S. Lovecchio, W.M. Durham, R. Stocker

12:12 - 12:30 *Micro-swimmer dynamics in free-surface turbulence subject to wind stress*
C. Marchioli, S. Lovecchio, A. Soldati

12:30 - 12:48 *Buoyancy regulation of non-motile phytoplankton in a turbulent flow*
M. Borgnino, I. Tuval, F. De Lillo, G. Boffetta

12:48 - 14:15 Working Lunch with Round-Table Discussion

14:15 - 15:00 *Preferential sampling and small-scale clustering of gyrotactic micro-swimmers in turbulence*
K. Gustavsson, F. Berglund, P.R. Jonsson, B. Mehlig

15:00 - 15:30 *Role of hydrodynamics in cell motility: Mesoscale hydrodynamic simulations*
R.G. Winkler

15:30 - 16:00 *Oil-microbe interactions: role of chemotaxis and hydrodynamics*
A. Ardekani, N. Desai, V. Shaik

16:00 - 16:30 Coffee Break

16:30 - 16:48 *Distribution of gyrotactic micro-organisms in complex three-dimensional flows: Horizontal shear flow past a vertical circular cylinder*
L. Zeng, T.J. Pedley

16:48 - 17:06 *Gravitational motion induced by gyrotactic micro-organisms near a vertical wall in a horizontal stagnation point flow*
T.J. Pedley, L. Zeng

17:06 - 17:24 *Confinement and substrate topography control 3D cell migration*
I. Aronson, B. Winkler, F. Ziebert

17:24 - 17:42 *Thermal stratification hinders gyrotactic micro-organism rising in free-surface turbulence*
A. Soldati, S. Lovecchio, F. Zonta, C. Marchioli

Thursday, May 17

9:00 - 9:45 *Painting with Bacteria: Three ways*
W.C.K. Poon

9:45 - 10:15 *Shear-induced migration and banding instabilities in bacterial suspensions*
L. Rao, P. Garg, G. Subramanian

10:15 - 10:40 Coffee Break

10:40 - 10:58 *Divergence of the velocity variance in interacting swimmer suspensions*
S. Nambiar, G. Subramanian

10:58 - 11:16 *Optimizing performance of micro-swimmers: The role of hydrodynamic interactions*
N. Giuliani, A. De Simone

11:16 - 11:34 *Study of biological and bio-inspired swimming at low Reynolds numbers using an immersed boundary method*
V. Meschini, G. Noselli, M. Chinappi, R. Verzicco, A. De Simone

11:34 - 11:52 *Linking individual and collective dynamics of sperm in suspension*
S.F. Schoeller, E. Keaveny

11:52 - 12:10 *E-coli swimming and scattering at surfaces - A mesoscale simulation study*
M. Mousavi, T. Eisenstecken, G. Gompper, R.G. Winkler

12:10 - 12.28 *Swimming and rafting of E-coli microcolonies at air-liquid interfaces*
G. Sinibaldi, V. Iebba, M. Chinappi

12:28 - 14:00 Working Lunch with Round-Table Discussion

14:00 - 14:30 *Oscillatory surface rheotaxis of swimming E. coli bacteria*
A. Mathijssen, N. Figueroa-Morales, G. Junot, E. Clement, A. Lindner, A. Zöttl

14:30 - 15:00 *Bacterial chemotaxis during biofilm formation*
N.M. Oliveira, K.R. Foster, W.M. Durham

15:00 - 15:18 *Photoactive microbes -Light-switchable adhesion and motility in confinement*
C.T. Kreis, A. Fragkopoulos, T. Ostapenko, T. Böddeker,

	O. Bäumchen
15:18 - 15:36	*Painting with light-powered bacteria: Smart templated self assembly using microswimmers* J. Arlt, V.A. Martinez, A. Dawson, T. Pilizota, W.C.K. Poon
15:36 - 15:54	*Hydrodynamic genesis of colloidal creatures* B. Delmotte, M. Driscoll, A. Donev, P. Chaikin
15:54 - 16:20	Coffee Break
16:20 - 16:38	*Capillary deposition of microorganisms in a microfluidic channel for the study of cells in spatially controlled environments* R. Pioli, E. Secchi, L. Isa, R. Stocker
16:38 - 16:56	*Numerical design of a T-shaped microfluidic device for the detection of diseased cells through deformability-based separation* M.M. Villone, M. Trofa, M.A. Hulsen, P.L. Maffettone
16:56 - 17:14	*Flocking particles with asymmetric obstacles: A model for isolation and sorting motile cells and unicellular organisms* R. Martinez, F. Alarcon, D. Rogel-Rodriguez, J. Ramirez, J.L. Aragones, C. Valeriani
17:14 - 17:32	*A minimal physical model for cell migration in presence of obstacles* A. Basoni, G. Gonnella, D. Marenduzzo, E. Orlandini, A. Tiribocchi
17:32 - 17:50	*Endocytic reawakening of motility and flocking in jammed epithelia* F. Giavazzi, C. Malinverno, A. Ferrari, G. Scita, R. Cerbino
20:00 - 22:00	Social dinner

Friday, May 18

9:00 - 9:45	*Hydrodynamics and phase behaviour of active suspensions* S. Fielding
9:45 - 10:15	*Collective response of actuated and self-propelling colonies* I. Pagonabarraga
10:15 - 10:33	*Large speed enhancement of swimming bacteria in dense polymeric fluids* A. Zöttl, J.M. Yeomans
10:33 - 10:51	*Scaling of bacteria swimming in polymer solutions* C. Devailly, A. Dawson, J. Arlt, J. Schwarz-Linek, A. Morozov, W.C.K. Poon, V. Martinez
10:51 - 11:10	Coffee Break
11:10 - 11:28	*Bacteria push the limits of sensory precision to navigate dynamic seascapes* D. Brumley, F. Carrara, A. Hein, Y. Yawata, S. Levin, R. Stocker
11:28 - 11:46	*Simulating bacterial motility in confined environments* J. Lagrone, L. Fauci, R. Cortez

11:46 - 12:04	*Transport of swimming bacteria in porous media flows* A. Dehkharghani, N. Waisbord, J. Dunkel, J. Guasto
12:04 - 12:22	*Relationship between bacterial motility and biofilm preventive properties on coatings with from soft to stiff mechanical properties* M. Veuillet, C. Soraru, A. Airoudj, Y. Gourbeyre, E. Gaudichet-Maurin, V. Roucoules, L. Ploux
12:22 - 12:40	*Transport and diffusion of micro-particles in active suspensions* B. Delmotte, E. Keaveny, F. Plouraboué, E. Climent
12:40 - 12:58	*A Spheroidal Squirmer in Shear Flow* K. Qi, E. Westphal, G. Gompper, R.G. Winkler
12:58 - 13:10	Closing
13:10 - 14:30	Lunch Break

Invited lectures: 45 minutes, including questions (4 mins) & change of speaker (1 min)
Keynote lectures: 30 minutes, including questions (3 mins) & change of speaker (1 min)
Regular talks: 18 minutes, including questions (2 mins) & change of speaker (1 min)
Speaker's name is underlined.

Report composed by Cristian Marchioli

18-4 IUTAM Symposium on Model Order Reduction of Coupled Systems (MORCOS 2018)
Stuttgart, Germany, May 22 – May 25, 2018

a) Scientific Committee
Jörg Fehr, Germany – Conference Chairman
Bernard Haasdonk, Germany – Co-Chairman
Francisco Chinesta, France
Gianluigi Rozza, Italy
Anthony T. Patera, USA
Will Schilders, Netherlands
Taichi Shiiba, Japan
Peter Eberhard, Germany – IUTAM Representative

b) Short summary of the scientific progress achieved
Four keynote presentations where given by
Kathrin Smetana (University of Twente, Netherlands)
Olivier Brüls (University of Liege, Belgium)
David Knezevic (Akselos, Cambridge, USA)
Tommaso Tamarozzi (KU Leuven/Siemens PLM, Belgium)

From the abstracts submitted for the Symposium, 37 papers had been selected for oral presentation. Furthermore, 10 additional poster presentations where given including a poster flash.

In these 47 contributions, many aspects related to model order reduction were discussed. The importance of linking different physical domains by using MOR techniques was discussed. The contributions clearly showed the increase of functionality, the optimization possibilities for optimization, and the cost reduction.

The application examples ranged from civil structures to automotive and aeronautic systems, or the efficient simulation of gas networks. Applications from industry included the improved control via MOR of laser machines from TRUMPF, one of the many companies around Stuttgart.

The symposium was successful in bringing together mathematicians, engineers and computer scientist with practical and theoretical background and to encourage and strengthen their interdisciplinary work. Furthermore, it helped to create a link and a mutual understanding between the different research communities.

c) Countries represented and number of participants
The symposium had 56 participants from the following 11 countries:

Austria (1), Belgium (3), France (2), Germany (36), Italy (1), Japan (2), Netherlands (3), Nigeria (1), Spain (3), United Kingdom (2), United States (1).

d) Publication of proceedings of the Symposium

The proceedings of the Symposium will be published in the IUTAM Bookseries. The corresponding agreement with Springer International Media was made on April 11, 2016, and signed by the Symposium chairmen Jörg Fehr and Bernard Haasdonk.

e) Financial support

The Symposium fee for participants amounted to €330 for early registration and €380 for late registration. This fee included also lunches, the social program, the excursion to the Daimler Museum, and the conference dinner. Additional funding could be raised from the Cluster of Excellence SimTech, the German Research Foundation DFG and an industrial sponsors, namely the Robert Bosch GmbH.

Furthermore, the financial support by an IUTAM Grant is gratefully acknowledged.

f) Scientific program

Monday, May 21

18:00 - 20:00 Pre-Registration and Welcome-Reception – SimTech building Pfaffenwaldring 5a

Tuesday, May 22

09:00 - 09:30 Welcome Session

Session 1 Chair: Bernard Haasdonk

09:30 - 10:00 *Advances in Reduced Order Methods for Computational Fluid Dynamics Problems in Applied Sciences and Engineering: Perspectives*
Gianluigi Rozza*

10:00 - 10:30 *POD-Based Economic Model Predictive Control of Heat Convection Phenomena*
Luca Mechelli*, Stefan Volkwein

10:30 - 11:00 *Fully online ROMs based on LUPOD*
Maria-Luisa Rapún, Filippo Terragni, José Manuel Vega*

Session 2 Chair: Christian Himpe

11:30 - 12:00 *Model Order Reduction of Coupled, Parametrized Elastic Bodies for Shape Optimization*
Benjamin Fröhlich*, Florian Geiger, Jan Gade, Manfred Bischoff, Peter Eberhard

12:00 - 12:30 *Basis Selection for Non-intrusive Modal Substructuring of Geometric Nonlinear Finite Element Models*
Morteza K. Mahdiabadi*, Daniel J. Rixen

12:30 - 13:00 *Towards an Input-Aware System-Theoretic Model Order Reduction Approach for Nonlinear Systems*
Björn Liljegren-Sailer*, Nicole Marheinek

Keynote Presentation 1 Chair: Wil Schilders

14:15 - 15:00 *Optimal Interface Reduction for Static Condensation or Substructuring*
Kathrin Smetana*

Session 3 Chair: Gianluigi Rozza

15:00 - 15:30 *Hybrid Hyper-Reduced Modeling for Contact Problems in Elastostatics*
Jules Fauque*, Isabelle Ramière, David Ryckelynck

15:30 - 16:00 *A Novel Penalty Based Reduced Order Modelling Method for Dynamic Analysis of Jointed Structures with Localized Nonlinearities*
Jie Yuan*, Loic Salles

Session 4 Chair: Kathrin Smetana

16:30 - 17:00 *Model Order Reduction for Drilling Automation*
Harshit Bansal*, Laura Iapichino, Wil H.A. Schilders, Nathan van deWouw

17:00 - 17:30 *Structured Cross-Covariance-Based Model Reduction Applied to Gas Network Models*
Peter Benner, Sara Grundel, Christian Himpe*

Poster flash and poster presentation – International Meeting center
Chair: Peter Eberhard

18:30 - 18:32 *Reduced-Order Modelling and Computational Homogenisation in Magnetomechanics*
Benjamin Brands*, Julia Mergheim, Paul Steinmann

18:32 - 18:34 *Model Order Reduction for the Monodomain Reaction-Diffusion Equation in Neuro-Muscular*
Nehzat Emamy*, Pascal Litty, Thomas Klotz, Miriam Mehl, Oliver Röhrle

18:34 - 18:36 *Thermal Model Order Reduction Using Load Vector Snapshots to Consider Heat Radiation*
Stephan Rother*, Michael Beitelschmidt

18:36 - 18:38 *Model Order Reduction of an Elastic Body with Large Deformations*
Ashish Bhatt*, Jörg Fehr, Dennis Grunert, Bernard Haasdonk

18:38 - 18:40 *Towards a Stable and Fast Dynamic Skeletal Muscle Model*
Mylena Mordhorst*, Bernard Haasdonk, Oliver Röhrle

18:40 - 18:42 *Model Reduction for Switched Systems with Low-Rank Switching*
Philipp Schulze, Benjamin Unger*

18:42 - 18:44 *Error Estimation for the Simulation of Elastic Multibody Systems*
Jörg Fehr, Dennis Grunert*, Bernard Haasdonk, Ashish Bhatt

18:44 - 18:46 *Coupling of Incompressible Free-Surface Flow, Acoustic Fluid and Flexible Structure via a Modal Basis*
Florian Toth*, Manfred Kaltenbacher

18:46 - 18:48 *Polynomial Tensor-Based Stability Identification of Milling Process*
Chigbogu G. Ozoegwu

19:00 - 22:00 Symposium Reception with Poster Presentation – International Meeting center

Wednesday, May 23

Keynote Presentation 2 Chair: Jörg Fehr

09:00 - 09:45 *Model Order Reduction for Drivetrain Dynamics: From Linear MOR to Hyper-Reduction of Coupled Problems*
Tommaso Tamarozzi*

Session 5 Chair: Sigrid Leyendecker

09:45 - 10:15 *Mechatronic Simulation for the Development of Machine Tools Challenges for Model Reduction in an Industrial Application*
Alexandra Ast*, Aulon Bajrami, Kevin Diebels

10:15 - 10:45 *Mixing Model Order Reduction Methods with Augmented Reality Techniques: A New Paradigm to (Re)Discover*
Alberto Badias*, Icíar Alfaro, David Gonzalez, Francisco Chinesta, Elias Cueto

Session 6 Chair: Stephan Rave

11:15 - 11:45 *Application of Reduced-Order Modeling to CFD-Simulated Data for the Study of Wake Deflection within Wind Farms*
Alberto Fortes-Plaza*, Filippo Campagnolo, Carlo L. Bottasso

11:45 - 12:15 *Combining POD with Adaptivity for the Model Order Reduction of the Cahn-Hilliard System*
Carmen Gräßle*, Michael Hinze

12:15 - 12:45 *Randomized Generation of Localized Approximation Spaces for Parameterized Partial Differential Equations*
Andreas Buhr*, Kathrin Smetana

Session 7 Chair: Hermann Matthies

14:00 - 14:30 *Smart Sparse Sampling*
Rubén Ibáñez-Pinillo*, Emmanuelle Abisset-Chavanne, Elías Cueto, Francisco Chinesta

14:30 - 15:00 *A Reduced Model Approach for the Optimal Control of Dielectric Elastomer Actuated Systems*
Tristan Schlögl, Sigrid Leyendecker*

15:00 - 15:30 *Two-Stage Data-Assisted Mechanical Homogenization*
Felix Fritzen, Oliver Kunc*

Session 8 Chair: David Knezevic

16:00 - 16:30 *Reduced Order Models Using a Data-Driven and Equation-Free Method*
Soledad Le Clainche*, José M. Vega

16:30 - 17:00 *Proper Orthogonal Decomposition (POD) Combined with Hierarchical Tensor Approximation (HTA) in the Context of Uncertain Parameters*
Steffen Kastian*, Stefanie Reese, Dieter Moser, Lars Grasedyck

17:00 - 17:30 *Parameterised Reduced Order Models*
Hermann G. Matthies*, Roger Ohayon

Thursday, May 24

Keynote Presentation 3 Chair: Taichi Shiiba

09:00 - 09:45 *Component-Based Model Reduction for Industrial-Scale Problems*
David J. Knezevic*

Session 9 Chair: Felix Fritzen

09:45 - 10:15 *Online-Adaptive Localized Reduced Basis Approximation of Parameterized Parabolic Problems*
Mario Ohlberger, Stephan Rave*, Felix Schindler

10:15 - 10:45 *Experimental Dynamic Substructuring on a 3MW Wind Turbine*
Andreas Schulze*, János Zierath, Roman Rachholz, Reik Bockhahn, Sven-Erik Rosenow, Johannes Luthe, Christoph Woernle

Session 10 Chair: Olivier Brüls

11:15 - 11:45 *Recent Advances on Nonlinear Vibration Analysis Using Nonlinear Modes as Reduced Basis*
Malte Krack*, Johann Groß, Maren Scheel

11:45 - 12:15 *An Open Source Description for (Semi-)Automatic Generation and Model Reduction of Machine Tool Network Models*
Norman Lang, Andreas Naumann, Jens Saak*, Stefan Sauerzapf

13:15 - 17:30 Excursion – Mercedes-Benz Museum

19:00 - 23:00 Dinner – Alte Kanzlei

Friday, May 25

Keynote Presentation 4 Chair: Werner Schiehlen

09:00 - 09:45 *Nonlinear Projection Methods for Mechanical Structures and Systems*
Olivier Brüls*

Session 11 Chair: Frank Naets

09:45 - 10:15 *Combined Frequency-Time Reduction Methods for Calculating Periodic Solutions of Unilaterally Constrained Systems*
Frederic Schreyer, Remco I. Leine*

10:15 - 10:45 *Model Order Reduction of Linear Switched Systems with Constrained Switching*
Ion V. Gosea*, Igor P. Duff, Peter Benner, Athanasios C. Antoulas

Session 12 Chair: Tommaso Tamarozzi

11:15 - 11:45 *Index-Aware MOR for Gas Transport Networks*
Nicodemus Banagaaya*, Sara Grundel, Peter Benner

11:45 - 12:15 *Efficient Analysis of Impact Between Reduced Flexible Bodies*
Stephan Tschigg*, Pascal Ziegler, Robert Seifried

12:15 - 12:45 *Two-Stage Parametric Model Order Reduction for the Design Optimization of a Coupled Structural and Controller Model*
Frank Naets*, Wim Desmet

Session 13 Chair: Jens Saak

14:00 - 14:30 *Order-Reduction for Magneto-Quasistatic Fields Including Magnetic Material Characteristics of Saturation Type*
Romanus Dyczij-Edlinger*, Daniel Klis

14:30 - 15:00 *A Model Order Reduction Method for Electro-Magnetic Vibration Analysis of Electric Motors*
Akira Saito*

15:00 - 15:30 *Magnetically Levitated Vehicles: Coupling Multibody and Mechatronic Systems with Elastic Structures Subject to Model Order Reduction*
Werner Schiehlen*

15:30 - 16:00 Closing Session

Report prepared by Jörg Fehr and Bernard Haasdonk

18-5 IUTAM Symposium on Size-Effects in Microstructure and Damage Evolution
Lyngby, Denmark, May 27 – June 1, 2018

Website: www.conferencemanager.dk/iutam

Organizers: Kim Lau Nielsen, Christian F. Niordson, Viggo Tvergaard

a) Scientific Committee
Alan Needleman, USA;
Marc Geers, Netherlands;
Kim Nielsen, Denmark;
Jean-Baptiste Leblond, France;
Norman Fleck, UK;
Christian Niordson, Denmark (Chair);
Lorenzo Bardella, Italy;
Viggo Tvergaard, Denmark (IUTAM Representative).

b) Short summary of scientific progress achieved
The aim of the symposium was to provide a scientific forum for theoretical, experimental and modeling advances within the field of size-effects in microstructure and damage evolution. The phenomena covered stretched over multiple length scales, from the dislocation level over the mesoscopic level of damage evolution, in the pursuit of insight into material hardening and strength.

Newly developed discrete dislocation models, phenomenological models and crystal plasticity models accounting for microstructural features such as voids, interfaces between phases and grain boundaries were presented. Numerical models for strain gradient and distortion gradient plasticity were presented together with their applications to void growth. Ductile fracture and localization was discussed in detail. Insights into a variety of composite problems across many length scales were provided. Novel results on modeling of failure in shear were presented in several presentations. The topic of hydrogen diffusion in metals and ensuing H-embrittlement was treated.

The basic foundation of modeling efforts in the field of size-effects was debated in several presentations, and it was emphasized that the field has matured beyond the point of qualitative predictions, and the quantitative capabilities of the size-dependent models will henceforth be essential.

The symposium brought together scientists from the field of experimental micromechanics, higher order continuum modeling as well as atomistic and discrete dislocation methods, with the common goal of advancing both understanding and

quantitative modeling of complex material systems. The scientific achievements presented at the symposium will have an important effect in setting the future scientific course in the research field of size-effects in micro-structure and damage evolution.

c) Countries represented and number of participants

50 people from 17 countries participated: Denmark (12), USA (9), France (7), Germany (4), Belgium (3), Italy (2), UK (2), Sweden (2), India (1), Japan (1), Switzerland (1), Poland (1), South Africa (1), Turkey (1), Norway (1), Spain (1), Italy (1)

d) Publication of Proceedings of the Symposium

A special issue of European Journal of Mechanics A/Solids will be published.

e) Financial support

5000 USD from IUTAM and additional support from Otto Mønsteds Fond and Danish Center for Applied Mathematics and Mechanics (DCAMM).

f) Scientific program

Sunday – 27 May 2018

18.00 - 20.00 Welcome reception in Copenhagen

Monday – 28 May 2018

09.00 - 09.30 Welcome by the Provost of DTU, Prof. Rasmus Larsen, and the organisers

09.30 - 10.00 *The Morphology of Grain Boundaries and Interfaces*, M. Ortiz

10.00 - 10.30 *Nanoscale Continuum Modelling of Dislocation-Phase Boundary Interaction*, R. Peerlings

11.00 - 11.30 *Chemo-Mechanical Modelling of Dislocation-Microstructure Interaction in Complex Alloys*, B. Svendsen

11.30 - 12.00 *Discrete Dislocation Plasticity Simulation of Size Effects in Porous Single Crystals*, S. Keralavarma

12.00 - 13.15 Lunch

13.15 - 13.45 *H(curl) Finite Element Analysis of Distortion Gradient Plasticity*, L. Bardella

13.45 - 14.15 *A Second-gradient Model for Porous Plastic Materials and its Application to the Numerical Prediction of Ductile Rupture*, J.-B. Leblond

14.15 - 14.45 *Micromechanical Modeling of Porosity Growth and Ratcheting under Monotonic and Cyclic Loading*, K. Danas

14.45 - 15.15 Coffee break

15.15 - 15.45 *Unraveling Fracture Phenomena through Strain Gradient Plasticity*, E. Martíınez-Paneda
15.45 - 16.15 *Hydrogen-Microvoid Interactions*, Z. Zhang
16.15 - 16.45 *Deformation-Diffusion Coupled Computational Model for Hydrogen Diffusion in Nanomaterials*, P. Ariza

Tuesday – 29 May 2018

09.00 - 09.30 *Strain Localization, Stabilization and Propagation in Layered Materials*, H.M. Jensen
09.30 - 10.00 *Mechanical Failure of Metal/Ceramic Interfaces: a Combined Experimentation and Simulation Study*, W.J. Meng
10.00 - 10.30 *Deformation Behavior of Modern Gold-Polymer-Nanocomposites*, S. Bargmann
10.30 - 11.00 Coffee break
11.00 - 11.30 *Stress States of Individual Grains in Austenitic Stainless Steel under Uniaxial Tensile Load*, G. Winther
11.30 - 12.00 *Strengthening Mechanisms in Fine-Grained Metals Processed by Severe Plastic Deformation*, M. Kuroda
12.00 - 13.15 Lunch
13.15 - 13.45 *Deciphering Fracture Surfaces: What Crack Roughness Teaches us about the Dissipation Mechanisms Driving the Toughness of Materials and their Associated Length Scales*, L. Ponson
13.45 - 14.15 *3D Effects on Void Growth in Plastically Anisotropic Materials*, B.N. Legarth
14.15 - 14.45 *Ductile Fracture of Multiphase Steel Sheets under Bending*, A. Srivastava
14.45 - 15.15 Coffee break
15.15 - 15.45 *Shear Failure versus Failure in Shear*, A. Benzerga
15.45 - 16.15 *Ductile Damage under Shear Dominated Loadings: in-situ Laminography Experiments and Localization Analysis*, D. Mohr
16.15 - 16.45 *Dynamic Shear Band Development in a Planar Single Crystal*, A. Needleman
19.30 Dinner

Wednesday – 30 May 2018

09.00 - 09.30 *On Intrinsic Length Scales in Martensitic Microstructures and Plastically Deformed Metals*, H. Petryk
09.30 - 10.00 *Regularization Operators at Finite Deformations, Application to Strain Localization in Single Crystals*, S. Forest
10.00 - 10.30 *Size Effects in Deformation Patterning Mechanical Metamaterials*, M.G.F. Geers
10.30 - 11.00 Coffee break

11.00 - 11.30 *Micromechanics of Deformation and Fracture in Highly Cross-linked Thermosets and Size Effects*, T. Pardoen

11.30 - 12.00 *Delivery of Therapeutics into the Inner Ear via Perforation of the Round Window Membrane*, J. Kysar

13.15 Social arrangement

Thursday - 31 May 2018

09.00 - 09.30 *Nanoporous Metallic Materials: Modeling and Experiments*, J. Hure

09.30 - 10.00 *Voids Size Effects on Mechanical Properties of Nanoporous Materials: Molecular Dynamics Simulations and Homogenization Based Modeling*, D. Kondo

10.00 - 10.30 *Size Effect in the Mechanical Response of Nanoporos Gold*, E. Lilleodden

10.30 - 11.00 Coffee break

11.00 - 11.30 *A SGP-based Model for Particle Induced Strengthening Accounting for Variations of Particle Size/Spacing and Particle/Matrix Interface Strength*, J. Faleskog

11.30 - 12.00 *Self-Similarly Expanding Ellipsoidal Inclusions as a Model for Deep Focus Earthquakes*, X. Markenscoff

12.00 - 13.15 Lunch

13.15 - 13.45 *Effect of Void Arrangement on Ductile Damage Mechanics in Nodular Cast Iron: In Situ 3D Measurements and Micromechanical Simulations*, T.F. Morgeneyer

13.45 - 14.15 *Strain Gradient Effects at Crack Tips and Stress Raisers*, N.A. Fleck (presented by E. Martíınez-Paneda)

14.15 - 15.00 *Discussion Session on the Current State of Strain Gradient Plasticity*, J.W. Hutchinson

15.00 - 17.00 Poster session

- *Cohesive Traction-Separation Relations Extracted from Micro-Mechanics Based Model Predictions*, R.G. Andersen
- *A Spatial Integration Technique for Self-Similar Problems: Indentation in Single Crystals*, K.J. Juul
- *Evolution of Voids in a Strain Gradient Enhanced Matrix*, I. Holte
- *A Homogenized Model for UD-composites with Fiber Breakage and Matrix Plasticity at Large Deformations*, K. Poulios
- *Effect of Pre-existing Dislocations on the Strength of Metals at very Small Scales*, P.O. Guglielmi
- *Size Effects in Wedge Indentation into a FCC Single Crystal*, J. Lynggaard

- *First Steps Towards the Healable Aluminum Alloys*, M. Arseenko
- *Enhancement of Fracture Resistance by Crack Deviation via Shape Memory Alloys Agents*, L. Zhao

19.30 Banquet dinner

Friday – 1 June 2018

09.00 - 09.30 *A Finite Strain FE-Implementation of the Fleck-Willis Rate-independent Gradient Theory*, K.L. Nielsen

09.30 - 10.00 *Further Perspectives on Rate-independent Strain-gradient Plasticity*, B.D. Reddy

10.00 - 10.30 *A Non-constant Plastic Length Scale: Evolution Laws and Their Implication*, C.F.O. Dahlberg

10.30 - 11.00 Coffee break

11.00 - 11.30 *Size-effects in the Mechanical Behaviour of Cellular Solids*, C. Tekoğlu

11.30 - 12.00 *Enhancement of Delamination Fracture Resistance of Composites by Fiber Bridging and Multiple Cracks*, B. Sørensen

12.00 - 12.15 Closing remarks

12.15 - 13.30 Lunch

Report composed by Christian Niordson

18-6 IUTAM Symposium on Acoustic/Elastic Metamaterials, Their Design and Applications

Beijing, China, June 5 – June 9, 2018

The symposium was very successful, with 35 participants, and a full three-day program of talks. This consisted of 33 invited talks. These ranged over all aspects of acoustic/elastic metamaterials; active metamaterial, dynamic homogenization, acoustic/elastic wave control methods and applications based on acoustic/elastic metamaterials. The symposium attracted also over 120 audiences.

a) Scientific Committee

Gengkai Hu (Chair, Beijing Institute of Technology, Beijing, China)
Andrew Norris (Co-Chair, Rutgers University, Piscataway, USA)
John Raymond Willis (University of Cambridge, Cambridge, UK)
Ping Sheng (Hong Kong University of Science and Technology, HK, China)
Graeme Milton (University of Utah, Salt Lake City, USA)
José Sánchez Dehesa (Universitat Politècnica de València, Valencia, Spain)
Marc Geers (Technische Universiteit, Eindhoven, Netherlands)
Ole Sigmund (Technical University of Denmark, Lyngby, Denmark)
Wei Yang (IUTAM representative, Zhejiang University, Zhejiang, China)

b) Short summary of scientific progress achieved

The last decade has witnessed an increasing interest in the study of acoustic/elastic metamaterials and their potential engineering applications. Acoustic/elastic metamaterials are a class of composite materials deliberately designed to have unusual effective material properties not readily found in nature. They considerably extend the allowed range of material properties and lead to unprecedented possibilities for material design and control of wave motion. They offer a novel solution for elastic and acoustic wave attenuation, vibration/wave cloaking and earthquake protection, etc. The objective of this symposium is to provide a platform for an inter-disciplinary exchange of ideas and recent progress of acoustic/elastic metamaterials between scholars and engineers in the fields of solid mechanics, wave mechanics, physics and material science.

In June 5-9 2018, we held a IUTAM symposium at Beijing Institute of Technology (BIT) on: “Acoustic/elastic metamaterials, their design and applications”. This brought together theoreticians, numerical modelers and experimentalists in a forum where the latest research developments were presented, provided an environment with constructive interchanges, and with the outcome that clear directions were established for future research, and for the implementation of research advances into practical application.

All sessions were held in the multi-function room in the International Education Exchange Mansion of BIT, and all lunches, tea/coffee breaks and the reception were held in the hall on the same building. This enabled an informal environment where as well as the scientific talks there was ample opportunity for informal discussions. Some highlights were:

- Robust discussion of acoustic/elastic metamaterials that can be very promising in the fields of vibration isolation and sound absorption.
- The newest development in nonlinear acoustic metamaterials and their microstructure designs.
- The increased understanding and potential importance of time-modulated and topological metamaterials that can realize non-reciprocal wave propagation and other unique wave phenomena.
- The potential applications of the acoustic metasurfaces with their abilities to manipulate sound waves in the deep subwavelength scale.

c) Countries represented and number of participants

Country of Origin	Number of participants
China	14
USA	10
HK,China	2
Republic of Korea	2
Canada	1
Denmark	1
France	1
Germany	1
Netherlands	1
New Zealand	1
Spain	1
TOTAL	**35**

d) Publication of Proceedings of the Symposium

None.

e) Financial support

We are grateful to NSFC (National Natural Science Foundation of China) for a grant of $15,000, Ministry of Education of China for a grant of $15,000 and Beijing Institute of Technology for a grant of $1,500 and facility support. These were instrumental in contributing to a successful symposium, and were used for partial travel support of those eligible participants who requested it.

f) Scientific program

Tuesday, June 6

Chair: Gengkai Hu
8:00 – 8:20, Opening Ceremony

Chair: Guoliang Huang
8:20 – 8:50, Ping Sheng, *Causality Constraint as a Design Tool for Sound Absorption Metastructures*
8:50 – 9:20, Steven Cummer, *Acoustic Metasurfaces and Applications*
9:20 – 9:50, Kon-Well Wang, *Nature-Inspired Multifunctional Adaptive Metastructures*
9:50– 10:30, Coffee Break

Chair: Ping Sheng
10:30 – 11:00, Tianjian Lu, *Acoustomechanical Metamaterials: Concept and Design Methodology*
11:00 – 11:30, Shengdong Zhao, *Continuously Tunable Acoustic Metasurface*
11:30 – 12:00, Jun Yang, *Sound Absorption by Acoustic Metamaterials with Optimized Pore Configuration*

Chair: Steven Cummer
14:00 – 14:30, Zhengyou Liu, *Valley and Weyl Topological Phononic Crystals*
14:30 – 15:00, Johan Christensen, *Parity-Time Synthetic Phononic Media and non-Hermitian Valley Transport*
15:00 – 15:30, Guancong Ma, *Adaptive Control of Reverberating Sound Field*
15:30 – 15:50, Coffee Break

Chair: Zhengyou Liu
15:50 – 16:20, Guoliang Huang, *Non-Reciprocal Wave Propagation in Modulated Metamaterials*
16:20 – 16:50, Rajesh Chaunsali, *Topological Manipulation of Stress Waves by Tunable 1D and 2D Mechanical Structures*
16:50 – 17:10, Xiaoming Zhou, *Design of Time-Varying Metamaterials Based on Many-body Microstructures*

Wednesday, June 7

Chair: Jinkyu Yang
8:00 – 8:30, Ole Sigmund, *Topology Optimization for Metamaterial Design*
8:30 – 9:00, Chuanzeng Zhang, *Guided Interface Elastic Waves in 2D Dissimilar Phononic Crystals and Metamaterials*
9:00 – 9:30, Zheng Li, *Manipulation of Elastic Waves Based on the Transformation Method and Metamaterials*
9:30 – 10:00, Zhihai Xiang, *Realizing a Broadband Low Frequency Vibration Isolator with an Isotropic Elastic Metamaterial*
10:00 – 10:20, Coffee Break

Chair: Jun Yang
10:20 – 10:50, Nicholas Fang, *Tailoring the Flow of Acoustic Waves by Architectured Metamaterials*
10:50 – 11:20, Zhuo Zhuang, *Design Micro Structure/Polymer Energy Dissipation Metamaterial*
11:20 – 11:50, Joo Hwan Oh, *Tailoring Flexural Waves with Elastic Metamaterial*
11:50 – 12:10, Yi Chen, *Pentamode Materials and Underwater Sound Control*

Chair: Nicholas Fang
14:00 – 14:30, Yoon Young Kim, *Perfect Transmodal Fabry-Perot Interferometer: From Theory to Design and Realization with Anisotropic Metamaterials*
14:30 – 15:00, Zichen Deng, *Symplectic Analysis on Band Gaps of Honeycomb Materials and Their Applications*
15:00 – 15:30, Guobiao Hu, *Metamaterial Beam with Coupled Local Resonators for Enhancing Vibration Suppression and Energy Harvesting*
15:30 – 16:00, Ashwin Sridhar, *Homogenization of Complex Emergent Elasto-Dynamics in Metamaterials*
16:00 – 16:20, Coffee Break

Chair: Yoon Young Kim
16:20 – 16:50, Jinkyu Yang, *Nonlinear Wave Dynamics in Origami-Based Mechanical Metamaterials*
16:50 – 17:20, Jihong Wen, *New Properties and Applications of Nonlinear Acoustic Metamaterial*
17:20 – 17:50, Michael R. Haberman, *Nonlinear Elastic Metamaterials with Pressure-Tunable Viscoelastic Losses*
17:50 – 18:20, Camille Perrot, *Rotational and Anisotropic Metasolids: A Generalized Analytic Model*

Thursday, June 8
Chair: Ole Sigmund
8:30 – 9:00, Bin Liang, *Twisted Acoustics: Manipulation of Acoustic Orbital Angular Momentum by Metasurface and Its Applications*
9:00 – 9:30, Ankit Srivastava, *Interface Conditions at the Boundaries of Metamaterials*
9:30 – 9:50, Coffee Break

Chair: Guoliang Huang
9:50 – 10:20, Yun Jing, *Asymmetrical Sound Transmission Through Acoustic Metasurfaces*
10:20 – 10:50, Ning Hu, *Wave fronts steering of elastic SV-waves in solids via a composite plates based metasurface*
10:50 – 11:10, Rui Zhu, *Elastic Metamaterials/Metastructures for Tunable Wave Mode Manipulations*

Report composed by Gengkai Hu

18-7 IUTAM Symposium on Critical Flow Dynamics Involving Moving/Deformable Structures with Design Applications

Santorini Island, Greece, June 18 – June 22, 2018

Organizers: Marianna Braza, Kerry Hourigan and Michael Triantafyllou

a) Scientific Committee

Dr. M. Braza, Co-Chairperson	IMF Toulouse - France
Prof. M. Triantafyllou, Co-Chairperson	MIT, USA
Prof. K. Hourigan, Co-Chairperson	Monash Univ. - Australia
Prof. G. Karniadakis	Brown Univ., USA
Prof. J.F. Rouchon	LAPLACE - Toulouse, France
Prof. B.J. Geurts	University of Twente - Netherlands
Prof. A. Bottaro	Univ. Genova, Italy
Prof. Bernhard Schrefler	Univ. of Padova, Italy, IUTAM representative

b) Short summary of scientific progress achieved

The present IUTAM symposium (www.smartwing.org/iutam) concerned an important domain of Theoretical and Applied Mechanics nowadays. It aimed at regrouping the multidisciplinary knowledge coming from the two scientific communities of Fluids and Structures. The symposium emphasized a unified approach which collates the knowledge coming from theoretical, experimental, numerical simulation and modelling in Fluid Dynamics (FD) and Structural Mechanics (SM), involving analysis of critical phenomena crucial for the design in both incompressible and compressible separated un-steady flows around moving and/or deformable structures. Specific attention was focused on the morphing of aerodynamic / hydrodynamic structures (particularly by using a new generation of electro-active intelligent materials), in order to increase their performances and to prepare new designs in aeronautics, marine hydrodynamics and bio-inspired science. One of the main objectives was the reduction of nuisance phenomena like separation, flutter instabilities, and high-frequency vibrations related to noise, the reduction of drag and increase of lift or thrust. The subject areas of the symposium generated significant interactions among the participants and collaborations concerning these scientific themes, covering domains of fundamental research and of industrial applications.The symposium hosted 40 oral presentations and a considerable number of the most renowned scientists in the field. This Symposium is distinguished by assembling fifteen invited presentations as well as target industries in this topic. The list of Keynote presentations can be found at

http://www.smartwing.org/iutam/?q=node/5

A more detailed description of the present Symposium activities can be found in:

www.smartwing.org/iutam/report_Braza_Hourigan_Triantafyllou

c) Countries represented and number of participants

The following Countries have been represented among 70 attendees for this 7-day Symposium: France, Germany, UK, Denmark, Switzerland, Italy, Spain, Greece, Poland, The Netherlands, Japan, China, India, Brazil, Canada, USA, Australia.

d) Publication of Proceedings of the Symposium

All abstracts and full papers were distributed to the participants on a USB-stick. The reviewed oral presentations are under editing for publication by Springer in a devoted book to the Symposium Proceedings.

e) Financial support

A IUTAM grant of EUR 5000 was used to attribute fellowships to 10 participants (students and young researchers) having given oral presentations, including gratuity from the registration fees.

f) Scientific program

Monday 18 June 2018:

8:30 - 9:30 *Registration and coffee break*
9:30 - 9:45 Welcome address

Session 1: Flow-Induced Vibrations
9:45 - 10:30 Emmanuel De Langre**,** LadHyX, Ecole Polytechnique, France
Opening Lecture
Does flexibility always reduce fluid-induced stresses in structures?
10:30-11:15: Chairperson: K. Hourigan
Flow-Induced Vibration of high-side-ratio rectangular cylinders. J. Zhao, K. Hourigan & M.C. Thompson.
Alteration of the spanwise structure of the turbulent flow past a cylinder subjected to vortex-induced vibrations. S. Gsell, R. Bourguet & M. Braza
Flow-induced vibration of two cylinders in tandem and staggered arrangements. M.D. Griffith, D. Lo Jacono, J. Sheridan & J.S Leontini
12:00 - 12:30:
Vortex induced vibration of symmetric airfoils used in vertical-axis wind turbines. B. Benner, D. Carlson, B. Seyed-Aghazadeh & Y. Modarres Sadeghi
Flow past an oscillating cylinder: effects of oscillation mode on wake structure. S. Peppa, L. Kaiktsis, C. E. Frouzakis & G.S. Triantafyllou
12:30 - 14:00 *Lunch*

Session 2: Numerical simulation of oscillating/vibrating flows around bodies
14:00 - 14:45 Bernard Geurts**,** University of Twente, Netherlands
Keynote Lecture
Reliability of large-eddy simulation in capturing unsteady separation
14:45 -15:15: Chairperson: M. Braza

Hydrodynamics of cylinders oscillating with small amplitude in still fluid or free stream. E. Konstantinidis & L. Baranyi
Validation of coupled CFD-CSM methods for vibration phenomena in nuclear reactor cores. A. Papukchiev, P. Pandazis, H.V. Hristov & M. Scheuerer
15:15 - 15:45 *Coffee break*

Session 3.I : Fluid-Structure Interaction arising in aerodynamics and flow control
15:45 -16:30 Patricia Ern**,** Institut de Mécanique des Fluides de Toulouse, France
Keynote Lecture
Oscillatory motion and wake of freely falling/rising bodies
16:30 - 17:15: Chairperson: K. Hourigan
Vibration mechanisms of two inline cylinders. B. Qin, MD. M. Alam & Y. Zhou
Experimental and numerical investigation of steady fluid forces in axial flow on a cylinder confined in a cylinder array. A. Joly, P. Badel, N. De Buretel De Chassey, O. Cadot, A. Martin, P. Moussou & L. Pastur
Aerodynamics and flow control of a flapping bristled wing. S. H. Lee, M. Lahooti & D. Kim

17:15 - 17:25 Posters: (5mn for each presentation including questions)
Numerical investigation on the thrust performance of bionic motion wing in schools. Chen Gang, Lv Jinan, Han Jiakun, Zhang Yang & Gong Chunlin
Stress analysis of wind turbine tower flange using fluid-structure interaction method. Myoungwoo Lee, Seok-Gyu Yoon & Youn-Jea Kim

18:00 *Visit of Santorini's Volcano*

Tuesday 19 June 2018:
Session 3.II: Fluid-structure interaction arising in aerodynamics and flow control
9:00 - 9:45 Jonathan Morrison**,** Dept. of aeronautics, Imperial College, London, U.K.
Keynote Lecture
Control of cellular separation using adaptive surface structure
9:45 - 10:30: Chairperson: P. Ern
The dynamics of bumblebee wing pitching rotation: measurement and modelling. D. Kolomenskiy, S. Ravi, R. Xu, K. Ueyama, T. Jakobi, T. Engels, T. Nakata, J. Sesterhenn, M. Farge, K. Schneider, R. Onishi & H. Liu
Transitional flow dynamics past a passively flapping airfoil in gusty flow. C. Bose, S. Gupta, S. Sarkar
Collective flapping dynamics of stacked conventional and inverted flags. Hyeonseong Kim & Dagyoum Kim
10:30 - 11:00 *Coffee break*

Session 4: Theoretical aspects, simulation and reduced-order modelling of fluid-structure interaction for deformable structures

11:00 - 11:45 Yiannis Ventikos, Mechanical Engineering Dept., University College London, UK
Keynote Lecture
Using multicompartmental poroelasticity to explore brain biomechanics and cerebral diseases

11:45 - 12:15:
Development of a three-dimensional multi-step ice accretion model based on level-set and IBM. A. Al-Kebsi, Y. Hoarau & R. Mose
The shearing mechanism over a deformed surface of breaking waves. S.G Sajjadi & J.C.R. Hunt

12:15 - 13:55 *Lunch*

14:00 - 14:45 Alessandro Bottaro, Scuola Politecnica, University of Genova, Italy
Keynote Lecture
Flow over and around porous, deformable bodies: perspectives from homogenisation theory

14:45 - 15:30: Chairperson: B. Geurts
Flutter instability close to a free surface: A local stability analysis. J. Mougel & S. Michelin
FSI simulation using a membrane model: inflation of balloons and flow past sails. A. Mohd Furquan & B. Sanjay Mittal
Numerical simulation on fixed mesh for feedback stabilization of fluid-structure interaction system with a structure given by a finite number of parameters. G. Delay, S. Ervedoza, M. Fournié & G. Haine

15:30 - 16:00 *Coffee break*

16:00 - 16:30 Erwan Liberge University of La Rochelle, France
Plenary Lecture
Parametric evolution of reduced order models for fluid-structure interaction

16:30 - 17:30: Chairperson: Y. Hoarau
Studying the transition in the flow around a cylinder using a low dimensional Galerkin model and sensitivity analysis. G. Patino, R. Gioria, J.A.P. Aranha & J.R. Meneghini
Reduced Order modelling for plasma aeroelastic control of airfoils in cascade: Dynamic Mode Decomposition. P. Neumann, V. Motta, L. Malzacher, D. Peitsch & G. Quaranta
Dynamic behavior of leading edge vortex and vorticity on suction surface of a heaving elastic airfoil. M. Fuchiwaki
Studying sound production in the hole-tone configuration using compressible and incompressible global stability analyses. R. Longobardi, D. Fabre, P. Bonnefis, V. Citro, F. Giannetti & P. Luchini

17:30 - 17:45 Posters:
Effects of kinematic parameters on bio-inspired flapping wing under the fluid-structure interaction. Han Jiakun, Chen Gang, A.J. Revell.
Topology of 2D boundary layer eruption based on different vortex criteria. A.R. Nielsen, M. Heil, M. Andersen & M. Brons

Diffusive flow characteristics of pollutants in the vicinity of buildings based on wind responses. Seok-Gyu Yoon, Myoungwoo Lee & Youn-Jea Kim

Wednesday 20 June 2018

Session 5: Rotating effects, fish motion, swimmers, energy harvesting

8:30 - 9:15 Eduardo Wesfreid**,** ESPCI Ecole Supérieure de Physique et de Chimie Industrielle, France
Keynote Lecture
Experiments on the wake instabilities behind a rotating sphere

9:15-10:15: Chairperson: J. Morrison

Smart swimmers. G. Novati, S. Verma & P. Koumoutsakos

Simultaneous energy harvesting using dual piezo-solar devices. M. Nabawy, J. Silva Leon, A. Kennaugh, A. Cioncolini & A.J. Revell

Hydrokinetic energy conversion using a single-cylinder nonlinear oscillator in flow induced vibrations. M.M. Bernitsas & H. Sun

Synergistic flow induced vibration of multiple cylinders in harvesting marine hydrokinetic energy. H. Sun & M.M. Bernitsas

10:15-10:40 *Brief coffee break*

10:40-13:00 *Visit of the archeological site "Acrotiri" by bus transportation*

13:00-14:30 *Lunch*

14:30-15:15 Yu Zhou, Harbin Institute of Technology, China
Keynote Lecture
Human versus artificial intelligence in turbulent jet control

15:15 - 15:45: Chairperson: M. Triantafyllou

Flapping foil hydrokinetic turbine: from a strongly coupled FSI solver to the experiment in a confined channel. L. Duarte, N. Dellinger, G. Dellinger, A. Ghenaim & A. Terfous

Machine learning of dynamics with applications to flow control and aerodynamic optimization. S.L. Brunton

15:45-16:15 *Coffee break*

Rest of the afternoon free

19:30: *Gala dinner at Monolithos beach*

Thursday 21 June 2018:

Session 6: Compressibility effects in fluid-structure interaction

9:00-9:45 Piotr Doerffer, Institute of Fluid-Flow Machinery, IMP-PAN, Polish Academy of Sciences, Gdansk, Poland
Keynote Lecture
Critical aspects of aerodynamic design involving shock boundary layer interaction in the light of European project TFAST

9:45 - 10:45: Chairperson: Yu Zhou

Shock waves asymmetry in a symmetric nozzle. Janusz Telega, Piotr Doerffer, Ryszard Szwaba, Krystyna Namiesnik

Transonic buffet over a supercritical wing by means of Organized Eddy Simulation with stochastic forcing capturing detached flow dynamics. N. Simiriotis, D. Szubet, I. Asproulias, J. Hunt, M. Braza
Numerical simulations for A320 profile in wind tunnel – test section design for the EU H2020 project SMS "Smart Morphing & Sensing for aeronautical configurations. P. Flaszynski, P. Doerffer & R. Szwaba
Effect of frozen turbulence assumption on the local blades vibration on the choke Flutter Instability in transonic UHBR Fan. P. Duquesne, S. Aubert, Q. Rendu & P. Ferrand
10:45 - 11:15 *Coffee break*
11:15-12:00: Chairperson: P. Flaszynski
Numerical and experimental investigations of buffet on a diamond airfoil designed for space launcher applications. J. Dumon, Y. Bury, N. Gourdain & L. Michel
Numerical simulation and modelling of a morphing supercritical airfoil in a transonic flow at high Reynolds number. J.-B. Tô, D.M. Zilli, N. Simiriotis, A. Marouf, Y. Hoarau & M. Braza,
Fluid-structure simulation of a piston shock-tube using an adaptive ALE scheme in the non-ideal compressible-fluid regime. B. Re & A. Guardone
12:00 - 14:00: *Lunch*

Session 7.I: Fluid-structure interaction, Morphing and Control
14:00-14:45 Jean-François Rouchon, Laboratoire de Plasma et Conversion d'Energie, Toulouse, France
Keynote Lecture
Electroactive morphing for the design of smart aero-structures involving innovative actuators
14:45 - 16:00: Chairperson: F. Auteri
Fabrication and characterization of folded foils supporting streamwise traveling waves. S. Calisch, N. Gershenfeld, D. Fan, G. Jodin & M. Triantafyllou
The Aerodynamic and aeroacoustic effect of passive high frequency oscillating trailing edge flaplets. E. Talboys, T. Geyer & C.H. Bruecker
Electroactive morphing vibrating trailing edge of a cambered wing: PIV, turbulence manipulation and velocity effects. G. Jodin, J.F. Rouchon, M. Triantafyllou, S. Cazin, P. Elyakime, M. Marchal, M. Braza
Experimental and numerical investigation of electro-active morphing on a supercritical wing in high Reynolds numbers. N. Simiriotis, G. Jodin, A. Marouf, Y. Hoarau, J.F. Rouchon & M. Braza
Camber actuation of an articulated wing with electromechanical actuators. A. Giraud, M. Cronel, I. Ramos & B. Nogarede

16:00 - 16:05 Posters:
Wind tunnel experimental design of an electroactive morphing high-lift flap on a two-element wing in subsonic speeds. Y. Bmegaptche, G. Jodin, A. Marouf, J.B. Tô, G. Harran, J.F. Rouchon & M. Braza
16:05 - 16:30 *Coffee break*

16:30-17:15 Haecheon Choi, Seoul National University, South Korea
Keynote Lecture
Bio-mimetic flow control for enhancing the aerodynamic efficiency

17:15 - 18:30: Chairperson: Y. Ventikos

Numerical study of trailing-edge dynamics of a two element airfoil-flap with Morphing flap at high Reynolds number. A. Marouf, N. Simiriotis, J.B. Tô, Y. Bmegaptche, Y. Hoarau, J.F. Rouchon & M.Braza

The passive separation control of an airfoil using self-adaptive hairy flaps. Chunlin Gong, Zhe Fang, Gang Chen & A.J. Revell.

Dynamic response of wall-mounted flaps in a crossflow. J. O'Connor & A.J. Revell

Comparison of low, medium and high fidelity numerical methods for unsteady aerodynamics and nonlinear aeroelasticity. C. Fernandez-Escudero, M. Gagnon, E. Laurendeau, S. Prothin, G. Michon & A. Ross

Effects of an oscillating flap on the main airfoil unsteady lift in grid turbulence. H. Stapountzis, A.Barlas, G. Papageorgiou, A. Patsiouras.

Friday 22 June 2018:

Session 7.II: Fluid-structure interaction, Morphing and Control

8:30 - 9:15 Julian Hunt, University College London, UCL, UK and IMFT, France
Keynote Lecture
Fundamentals and applications of critical fluid-fluid turbulent interfaces interacting with singularities of thin deformable solid structures

9:15 - 9:45 Chairperson: H. Choi

Fast sensitivity analysis for the design of morphing airfoils at different frequency regimes. F. Kramer, M. Fuchs, T. Knacke, C. Mockett, E. Özkaya, N. Gauger & F. Thiele

Thin shear layers in high resolution Direct Numerical Simulations of turbulence. T. Ishihara, K. Morishita & J.C.R. Hunt

9:45 - 9:55 Posters:

Modeling of magnetic shape memory alloys dedicated to a high frequency vibrating trailing edge morphing wing. M. Carvalho, G. Jodin, C. Nadal, J.F. Rouchon & M. Braza

An explanatory theory for unsteadiness of aerodynamic characteristics of variable sweep morphing aircraft. P. Bai, Q. Chen, F. Li

9:55 - 10:30 *Coffee break*

10:30 - 11:00 Alain Fontaine, Airbus and Pégase Co.
Keynote Lecture
Challenges of aeronautic industry

11:00 - 11:45: Chairperson: J.F. Rouchon

Scaling laws for an airfoil with MFC-actuated trailing edge plate. F. Auteri, P. Bettini & N. Bonfanti

CFD simulations with dynamic morphing on the Airbus A320 airfoil. K. Diakakis & G. Tzabiras
URANS flow calculations around a morphing and heaving airfoil. S. Polyzos & G. Tzabiras

Session 8 Bifurcations and analytic modelling in FSI
11:45 - 12:30 Horia Hangan, Wind Engineering, Energy and Environment (WindEEE) Research Institute - Canada
Keynote Lecture
Large scale physical simulations of 3D, non-stationary and non-Gaussian wind flows with applications to moving/deformable structures
12:30 - 13:00: Chairperson: A. Bottaro
General boundary identification through surface pressure measurements on a 2-D foil. J.H. Clark & J.M. Dahl
Analytic modeling of a size-changing swimmer. G.D. Weymouth & F. Giorgio-Serchi

13:00 *Closing address of the Symposium*
13:10-14:30 *Lunch*

Report composed by Marianna Braza, Kerry Hourigan, Michael Triantafyllou

18-8 IUTAM Symposium on Mechanical Environments of Living Cells
Xi'an, China, June 28 – June 30, 2018

WEBSITE: http://www.iutam-melc2018.cn

Organisers: Tian Jian Lu (China), Guy M. Genin (USA), Feng Xu (China)

a) Scientific Committee
Vikram Deshpande, UK; René van Donkelaar, The Netherlands; Adam Engler, USA; Clark Hung, USA; Patrick McGarry, Ireland; Vicky Nguyen, USA; Vivek Shenoy, USA; Stavros Thomopoulos, USA; Anthony Weiss, Australia; Norman Fleck, UK (IUTAM Representative).

b) Short summary of scientific progress achieved
The mechanical microenvironment of cells plays a critical role in regulating a broad range of cell behaviors, from development and healing to degradation and disease. Unraveling and controlling these is a critical need for the mechanics community. Engineering hetero-geneous and dynamic cell mechanical micro-environments is a major focus of the field. Studies on mechanobiology and cell mechanotrans-duction have greatly enriched our knowledge and provided potential molecular targets for clinical mechanotherapies and agricultural mechano-protectants.

In June 28-30 2018, we held an IUTAM Symposium on Mechanical environments of living cells in Xi'an, China. The symposium provided researchers from different countries with a unique opportunity to gain an appreciation of state-of-the-art information at the cutting edge of scientific progress and to address areas of rapidly developing, inter-disciplinary research on the engineering of cell mechanical microenvironment.

The symposium discussed the most important questions in this filed, including:

- Biomimetic and micro-/nano-engineered materials for simulating cell micro-environments
- Characterization of microenvironments
- Predictive models for cell mechanobiology
- Applications of the engineering of the cell mechanical microenvironment

c) Countries represented and number of participants
In total, there were twenty-three oral presentations at the symposium and there were one hundred delegates in all. The oral presenters were drawn from 4 countries as follows: China (15), United States (6), Singapore (1), and Ireland (1).

d) Publication of Proceedings of the Symposium

Selected full-length papers will be published in a special issue of Acta Mechanica Sinica, the 33-year-old official journal of the Chinese Society of Theoretical and Applied Mechanics. There will be about twelve papers in this special issue, which are anticipated to be published early in 2019.

e) Financial support

Financial supports of RMB100,000 from the National Natural Science Foundation of China (11842015) and RMB60,000 from the Project of Foreign Cultural & Educational Experts of Xi'an Jiaotong University are greatly appreciated.

f) Scientific program

Thursday, June 28

On-site Registration, Wyndham Grand Xian South Hotel

Friday, June 29

8:30-8:35 Welcome Address, Tian Jian Lu

SESSION 1, Function Room 2, Chair: Xiqiao Feng

8:35-9:00 Ning Wang: *Generation of elastic round microgels to quantify 3D tractions in vitro and in vivo*

9:00-9:25 Mian Long: *Multiscale mechanobiology and engineered construction in liver*

9:25-9:50 Adam J. Engler: *Improving cardiovascular "Diseases-in-a-dish" with mechanics*

9:50-10:10 Group Photograph & Coffee Break

SESSION 2, Function Room 2, Chair: Ning Wang

10:10-10:35 Tian Jian Lu: *Metal foam based vitrification and ultrarapid inductive rewarming*

10:35-11:00 Xiqiao Feng: *Mechanobiology of solid tumors*

11:00-11:25 Chwee Teck Lim: *Modes of collective cell migration under geometrical and physical constraints*

11:25-11:50 Linhong Deng: *Migration and morphogenesis of airway smooth muscle cells on 3D tubular surface as physical cue for airway wall structural differentiation*

11:50-14:00 Lunch, Wyndham Grand Xian South Hotel

SESSION 3, Function Room 2, Chair: Stavros Thomopoulos

14:00-14:25 Baohua Ji: *Quantification of the collectivity of cell polarization and arrangement on patterned substrate*

14:25-14:50 Patrick McGarry: *Free-energy analysis of cell spreading on elastic substrates*

14:50-15:15 Yanan Du: *Mechanotransduction-modulated fibrotic microniches reveal the contribution of angiogenesis in liver fibrosis adhesion*
15:15-15:40 Fei Li: *Application of scanning probe microscopy in characterizations of cell microenvironment*
15:40-15:55 Coffee Break

SESSION 4, Function Room 2, Chair: Chwee Teck Lim
15:55-16:20 Jizeng Wang: *A diffusive-stochastic-viscoelastic model for cell-matrix adhesion*
16:20-16:45 Stavros Thomopoulos: *Tendon enthesis development and regeneration*
16:45-17:10 X. Edward Guo: *Building bone matrix via modeling and remodeling under mechanical loading*
17:10-17:35 Vicky Nguyen: *Micromechanical modeling study of the role of collagen mechanochemistry on the growth and remodeling of collagen tissues*
17:35-18:00 Guy M. Genin: *The plant peri-cellular microenvironment*
18:00-20:00 Banquet, Wyndham Grand Xian South Hotel

Saturday, June 30

SESSION 5, Function Room 2, Chair: Guy M. Genin
8:00-8:25 Yingxin Qi: *The role of microRNAs in dysfunction of endothelial cells induced by mechanical stresses*
8:25-8:50 Yonggang Lv: *Effect of 3D matrix mechanics on bone repair*
8:50-9:15 Hongyuan Jiang: *Mechanical response of an open system: Shape and dynamics of adhesive cells*
9:15-9:40 Min Lin: *Nanoscale integrin cluster dynamics controls cellular mechanosensing via FAKY397 phosphorylation*
9:40-9:55 Coffee Break

SESSION 6, Function Room 2, Chair: X. Edward Guo
9:55-10:20 Jin Qian: *Mechanical responses of crosslinked biopolymer networks with active motors*
10:20-10:45 Yuntao Xia: *Matrix, myosin, and lamin-A coordinately affect DNA repair via curvature-induced nuclear rupture*
10:45-11:10 Xinghua Shi: *The mechanics of target drug delivery*
11:10-11:35 Feng Xu: *Engineering the 3D cell mehcanical microenvironment*
11:35-11:50 Closing Ceremony
11:50-14:00 Lunch, Wyndham Grand Xian South Hotel

Report composed by Tian Jian Lu

18-9 IUTAM Symposium on Exploiting Nonlinear Dynamics for Engineering Systems (ENOLIDES 2018)
Novi Sad, Serbia, July 15 – July 19, 2018

http://enolides.ftn.uns.ac.rs/
https://www.youtube.com/watch?v=vN8LFLIwR1I&feature=youtu.be

CHAIR: Ivana Kovacic, Serbia
CO-CHAIR: Stefano Lenci, Italy

a) Scientific Committee
Balakumar Balachandran, USA
Mohamed Belhaq, Morocco
Matthew Cartmell, UK
Peter Eberhard, Germany, *IUTAM representative*
Haiyan Hu, China
Giuseppe Rega, Italy, *President*
Jerzy Warminski, Poland
Hiroshi Yabuno, Japan

b) Short summary of scientific progress achieved
The ENOLIDES Symposium was devoted to demonstrating the benefits and unlocking the potential of exploiting nonlinear dynamical behaviour in emerging fields of science and engineering. The following specific objectives were achieved:

- reflecting the state-of-the-art and enabling exchange and creation of new ideas in targeted application of nonlinear dynamics,
- creating synergy in identifying new and potential application fields, and
- building new partnerships for new collaborative research projects.

c) Countries represented and number of participants
Distribution of unique authors per countries: Austria 1, Belgium 3, Brazil 8, Canada 1, China 6, France 8, Germany 1, Greece 4, Hungary 7, India 5, Israel 6, Italy 15, Japan 3, Morocco 3, Netherlands 2, Poland 7, Russia 1, Saudi Arabia 1, Serbia 12, Switzerland 6, United Kingdom 3, United States 12.

3 Keynote Lectures
3 Tribute Lectures
37 Longer Oral Presentations (LOPs)
15 Shorter Oral Presentations (SOPs) by PhD students
63 participants

d) Publication of Proceedings of the Symposium

The Book of Extended Abstract has been published as a hard copy version (ISBN 9788660220631) and also as an electronic version (ISBN 9788660220624). Both versions are distributed to all the participants.

Based on the accepted Extended Abstracts, full papers will be published after the Symposium in the IUTAM Bookseries by Springer (the book is in press).

e) Financial support

IUTAM: 5000 USD; Ministry of Education, Science and Technological Development of the Republic of Serbia: 170000 RSD; Secretariat for Higher Education and Scientific Research of the Autonomous Province of Vojvodina: 250000 RSD.

f) Scientific program

Monday, 16 July 2018

11.00am-12.00pm Keynote 1 Juergen Kurths: *Quantifying stability in deterministic and stochastic complex networks and its application to power grids*
12.00pm-12.30pm Tribute 1 Ferdinand Verhulst: *Henri Poincaré (1854-1912)*

1.45pm-2.10pm Richard Rand, Alan Zehnder, Bhattacharjee Shayak: *Dynamics of a system of two coupled mems oscillators*
2.10pm-2.35pm Tamas Molnar, Zoltan Dombovari, Tamas Insperger, Gabor Stepan: *Semidiscretization method for nonlinear time-periodic time-delay systems*
2.35pm-3.00pm Krystian Polczyński, Adam Wijata, Grzegorz Wasilewski, Grzegorz Kudra, Jan Awrejcewicz: *Modelling and analysis of bifurcation dynamics of two coupled pendulums with magnetic forcing*
3.00pm-3.25pm Piotr Brzeski, Jerzy Wojewoda, Tomasz Kapitaniak, Jurgen Kurths, Przemyslaw Perlikowski: *Analysis of dynamical systems with sample based method*

3.50pm-4.15pm Oded Gottlieb, Mark Ishay, David Degani: *Reduced-order model based stabilization of a self-excited elastically restrained slender body in uniform flow*
4.15pm-4.40pm Sandor Beregi, Denes Takacs, Gabor Stepan: *Bistability of straight-line motion of towed vehicles*
4.40pm-5.05pm Vishal Chikkerur, Nishanth Lingala, Hoong Chieh Yeong, Navaratnam Sri Namachchivaya, Peter W. Sauer: *Random perturbations of a three-machine power system network*
5.05pm-5.30pm Sunit Gupta, Pankaj Wahi: *Rotary speed modulation to improve the stability of steady drilling*

Tuesday, 17 July 2018

9.00am-10.00am Keynote 2 Balakumar Balachandran: *Nonlinear dynamics with noise*

10.00am-10.25am Valeria Settimi, Giuseppe Rega, Eduardo Saetta: *Unveiling transient to steady effects in reduced order models of thermomechanical plates via global dynamics*

10.25am-10.50am Flavio Massimi, Andrea Arena, Walter Lacarbonara: *Dynamic morphing of actuated elastic membranes*

11.15am-11.40am Agnessa Kovaleva: *Energy transport and localization in weakly dissipative resonant chains*

11.40am-12.05pm Mohamed Belhaq, Zakaria Ghouli, Mustapha Hamdi: *Energy harvesting in Duffing-Mathieu-van der Pol MEMS device using time delay*

12.05pm-12.30pm Ivana Kovacic, Zvonko Rakaric, Miodrag Zukovic: *Bursting oscillations in systems with low-frequency excitations: models and quantification*

12.30pm-12.55pm Ioannis Georgiou: *Energy flow considerations in nonlinear systems: experiments with three paradigmatic systems in engineering*

2.00pm-2.25pm Giuseppe Habib, Francesco Romeo: *TMD vs TBNES: a quantitative comparison in broadband operation*

2.25pm-2.50pm Diala Bitar, Alireza Ture Savadkoohi, Claude-Henri Lamarque, Emmanuel Gourdon, Manuel Collet: *Targeted nonlinear energy transfer for electroacoustic absorbers*

2.50pm-3.15pm Giovanna Campedelli, Guilherme Franzini, Carlos Mazzilli: *Further numerical studies on passive suppression of parametric instability using a rotative non-linear energy sink*

3.15pm-3.40pm Emmanuel Gourdon, Alireza Ture Savadkoohi, Claude-Henri Lamarque: *On the nonlinear interactions between an acoustical mode and an Helmholtz resonator*

4.05pm-4.15pm Zakaria Ghouli, Mustapha Hamdi, Mohamed Belhaq: *Energy harvesting in excited Duffing harvester device under modulated delay amplitude*

4.15pm-4.25pm Aravind Kumar Kamaraj, Shaikh Faruque Ali, Arockiarajan Arunachalakasi: *Limits for inter-well oscillations in tristable energy harvesters driven by random excitations*

4.25pm-4.35pm Ghislain Raze, Gaetan Kerschen: *A multimodal nonlinear tuned vibration absorber*

4.35pm-4.45pm Maor Farid, Oleg Gendelman: *Response regimes in equivalent mechanical model of weakly nonlinear liquid sloshing*

4.45pm-4.55pm Weiyan Wei, Xinzhe Xu, Hiroshi Yabuno: *Nonlinear analysis of hunting motion of a railway wheel set by using a roller rig*

4.55pm-5.10pm Discussion

Wednesday, 18 July 2018

9.00am-9.30am Tribute 2 Michael J. Brennan, Ivana Kovacic: *Georg Duffing (1861-1944)*
9.30am-9.55am Bin Tang, Shibo Wang, Michael J. Brennan: *Identifying the parameters of a Duffing oscillator using its free decay response perturbed with Gaussian white noise*
9.55am-10.20am Ivana Kovacic, Gianluca Gatti: *Exact solutions for the response of free and forced nonlinear oscillators: from theory to experiments*
10.20am-10.45am Livija Cveticanin: *Periodically forced and damped truly nonlinear two-degrees-of-freedom oscillator*
10.45am-11.10am Wim T. van Horssen: *On solving string equations subject to nonclassical boundary conditions*

11.35am-12.00pm Gianluca Gatti, Michael J. Brennan, Bin Tang: *Some benefits of geometric stiffness nonlinearity in mechanical and mechatronic systems*
12.00am-12.25pm Rui Zhu, Yitian Wang, Xiaoning Liu, Gengkai Hu: *Harnessing geometric nonlinearity to design tunable twist-coupled metastructure*
12.25pm-12.50pm Thibaut Detroux, Gaetan Kerschen: *Tailoring mechanical nonlinearities using spline-based optimization*
12.50pm-1.15pm Ivana Kovacic, Miodrag Zukovic, Dragi Radomirovic: *Tree-like structures as hierarchical coupled oscillators: potentials for biomimetic engineering design*

2.15pm-2.25pm Shobhit Jain, Paolo Tiso, George Haller: *Exact nonlinear model reduction for a von Kármán beam*
2.25pm-2.35pm Lukasz Kloda, Stefano Lenci, Jerzy Warminski: *Nonlinear dynamics of a planar hinged-simply supported beam with one end spring: higher order resonances*
2.35pm-2.45pm Guiherme Vernizzi, Guilherme Franzini, Celso Pesce: *Non-linear free vibrations of a catenary cable with small sag*
2.45pm-2.55pm Arthur Givois, Olivier Thomas, Jean-François Deü: *Nonlinear dynamics of a piezoelectric laminated nanoplate: an original reduced-order finite element model*
2.55pm-3.05pm Devin Kalafut, Anil Bajaj, Arvind Raman: *Measured and simulated tri-stability in MEMS capacitive switches*
3.05pm-3.20pm Discussion
3.20pm-3.30pm Sten Ponsioen, Tiemo Pedergnana, George Haller: *Automated computation of autonomous spectral submanifolds for nonlinear modal analysis*
3.30pm-3.40pm Thomas Breunung, George Haller: *Analytic calculation of the forced response and backbone curve from spectral submanifolds*
3.40pm-3.50pm Itzhak Shiroky, Oleg Gendelman: *Shockwaves and kinks in exothermic nonlinear chains*

3.50pm-4.00pm Nemanja Andonovski, Stefano Lenci, Ivana Kovačić: *High speed computing of basins of attractions for high dimensional nonlinear dynamical systems*
4.00pm-4.10pm Vladimir Živaljević, Dušan Kovačević, Zvonko Rakarić: *Analytical and FEM modelling of the behaviour of pile in dynamic load test*
4.10pm-4.25pm Discussion

Thursday, 19 July 2018
9.00am-9.30am Tribute 3 Giuseppe Rega: *Ali Hasan Nayfeh (1933-2017)*
9.30am-9.55am Matthew Cartmell, Niloufar Motazedi: *Using symbolic computational dynamics as an aid to design*
9.55am-10.20am Alois Steindl: *Birth of a Shilnikov orbit in a Hopf-Takens-Bogdanov interaction*
10.20am-10.45am Nikolaos Potosakis, Elias Paraskevopoulos, Sotirios Natsiavas: *An augmented Lagrangian approach for multibody dynamics based on a three field weak formulation*
10.45am-11.10am Fotios Georgiades: *Remarks about perpetual points in mechanical systems*

11.35am-12.00pm Enrico Babilio, Stefano Lenci: *A finite element formulation for dynamic analyses of a novel nonlinear beam model*
12.00pm-12.25pm Carlos Mazzilli, Eduardo Ribeiro: *Asynchronous modes of beams on elastic media subjected to varying normal force: continuous and 3 DOF models*
12.25pm-12.50pm Angelo Luongo, Daniele Zulli: *Nonlinear dynamics of shear-shear-torsional beams modeling tall buildings*

1.50pm-2.15pm Jerzy Warminski, Jaroslaw Latalski: *Vibrations of rotating thin-walled composite beams with nonlinear piezoelectric layers*
2.15pm-2.40pm Lucio Demeio, Stefano Lenci: *Dynamic analysis of a beam subject to a bouncing mass*
2.40pm-3.05pm Sotirios Natsiavas, Elias Paraskevopoulos: *An analytical study on the nonlinear dynamics during α single frictional contact of mechanical bodies*
3.05pm-3.30pm Ivana Atanasovska, Dejan Momčilović, Radivoje Mitrović, Nataša Soldat, Nikola Nešić: *Nonlinear dynamics as a tool in selection of working conditions for radial ball bearing*
3.30pm-4.30pm Keynote 3 Mohammad Younis: *Nonlinear dynamics in micro and nano systems*

Report composed by Ivana Kovacic

18-10 IUTAM Symposium on Mechanical Design and Analysis for AM Technologies (AMT 2018)
Moscow, Russia, August 20 – August 25, 2018

WEBSITE: http://ipmnet.ru/amt2018/
Organiser: Alexander Manzhirov (Institute for Problems in Mechanics, Russian Academy of Sciences, Russia)

a) Scientific Committee
Alexander Manzhirov (Chair), *Institute for Problems in Mechanics, Russian Academy of Sciences, Russia*
Holm Altenbach, *Lehrstuhl für Technische Mechanik, Institut für Mechanik, Fakultät für Maschinenbau, Otto-von-Guericke Universität, Magdeburg, Germany*
Samuel Forest, *Centre des Matériaux, Corbeil-Essonnes, France*
Narinder Gupta, *Indian Institute Technology Delhi, New Delhi, India*
Guozheng Kang, *Southwest Jiaotong University, Chengdu, China*
Andrew Nee, *National University of Singapore, Singapore*
Vadim Silberschmidt, *Loughborough University, Leicestershire, UK*

IUTAM Representative:
Irina Goryacheva, *Institute for Problems in Mechanics, Russian Academy of Sciences, Russia*

b) Short summary of scientific progress achieved
The symposium program covers such topics as the fundamental problems of mechanical design and analysis for AM technologies, theoretical, experimental, and computational problems of AM, AM theory and principles, methods for the solution of main boundary value problems, experimental methods for research of AM fabricated parts, development of numerical methods for AM processes, digital design for AM fabrication, additive manufacturing of metals, direct metal laser sintering, selective laser melting, electron beam melting, laser engineering net shape, electron beam additive manufacturing, binder jetting, nanoparticle jetting, plastic 3D printing, selective laser sintering, multi jet fusion, material jetting, stereolithography, digital light processing, continuous digital light processing, laminated object manufacturing, drop on demand, electrolytic formation, fused deposition modeling, 3D printing of concrete structures, crystal growth, growth of biological tissues, accretion problems, phase transitions, solidification of melts.

During the IUTAM Symposium on mechanical design and analysis for AM technologies a joint discussion of fundamental, computational, and applied problems of the new scientific area by leading mechanicians, mathematicians, physicists and

technologists, exchange of the latest ideas and achievements, as well as working out the main directions of its further development were carried out.

The Symposium Schedule included 6 keynote lectures, 16 oral and 10 poster presentations. The Symposium Schedule left plenty of time for interaction between the participants outside the programm of scheduled talks. This was particularly useful for the many young researchers who participated.

The mathematical modelling problem of additive manufacturing is a topical problem of natural science and engineering, which is yet to be solved completely. To solve this problem, coordinated effort of specialists in various fields of science, including mechanics, physics, chemistry, and biology, is needed. International events held under the aegis of IUTAM should become an efficient tool for information exchange and for the organization of interdisciplinary studies on growth problems.

c) Countries represented and number of participants

1. Armenia: 2 participants
2. Canada: 2 participants
3. China: 1 participant
4. France: 1 participant
5. Germany: 7 participants
6. Hong Kong: 1 participant
7. India: 5 participants
8. Russia: 62 participants
9. Singapore: 1 participant
10. South Africa: 5 participants
11. United Kingdom: 1 participant

Total number: 88 participants

d) Publication of Proceedings of the Symposium

The book of abstracts of the Symposium has been published under the title “IUTAM Symposium on mechanical design and analysis for AM technologies”.

e) Financial support

Grant IUTAM in the amount of $5,000.

f) Scientific program

21 August 2018 (Tuesday) 10:00–12:40

Keynote Session 1

Chairs: N.K. Gupta and E. Akinlabi

10:00–10:20 Opening Ceremony

10:20–11:00 A.V. Manzhirov, *Mechanics of Additive Manufacturing*

11:00–11:40 H. Altenbach, J. Tomas, and M. Merkel, *On the Optical Thermography in Selective Laser Melting Process*
11:40–12:00 Coffee Break
12:00–12:40 V. Silberschmidt, *3D-printed Polymers for Biomedical Applications*

21 August 2018 (Tuesday) 14:00–17:00
Oral Session 1
Chairs: J. Tomas and V.N. Hakobyan
14:00–14:20 A. Sahai, P. Yadav, R.S. Sharma, and N.K. Gupta, *Intensifying Hands-on Learning, Exploration, and Inventorship by Designing Fused Deposition Modeling Three Dimensional Printers*
14:20–14:40 A. Großmann, J. Gosmann, H.-S. Stumpfl, and Ch. Mittelstedt, *Lightweight Design and Mechanics of Cellular Solids in Selective Laser Melting*
14:40–15:00 S.D. Pavani, V. Fiske, G.R. Singh, K.H. Reddy, and R. Velmurugan, *Experimental Studies on Multilayered Composite Canister for Missile Applications*
15:00–15:20 Coffee Break
15:20–15:40 D. Paul, R. Velmurugan, N.K. Gupta, and A.V. Manzhirov, *The Effect of Particle Volume Fraction and Tube Dimensions on the Crushing Behaviour of Hollow Glass Particle-Filled GFRP Composite Tubes*
15:40–16:00 R.N. Naik and R. Velmurugan, *Homogenization and Experimental Determination of Mechanical Properties of the Plain Weave Carbon Fiber Reinforced Epoxy Composite*
16:00–16:20 G. Navya, A. Joshi, R. Velmurugan, R. Jayaganthan, N.K. Gupta, and A.V. Manzhirov, *Experimental and Numerical Simulation of Mechanical Behaviour of Ultrafine Grained AA 2014 Al Alloy*
16:20–16:40 P. Pawłowski, P. Płatek, M. Sarzyński, K. Kaźmierczak, G. Suwała, T. Fras, and J. Janiszewski, *Mechanical response of additively manufactured 2D regular cellular structures made of MS1 steel powder subjected to uniaxial loading tests*
16:40–17:00 A. Ni, *Development embedded laser module for AM in AETC IIET of RUDN*

22 August 2018 (Wednesday) 10:00–12:00
Keynote Session 2
Chairs: A.V. Sahakyan and V. Silberschmidt
10:00–10:40 E. Akinlabi, *Functionally Graded Materials: Trends and Advances*

10:40–11:20 K.E. Kazakov, *Contact Problems for Foundations with AM Fabricated Coatings*
11:20–11:40 Coffee Break
11:40–12:20 D.A. Parshin and N.K. Gupta, *Additive Manufacturing in Civil Engineering*

22 August 2018 (Wednesday) 14:00–17:00
Oral Session 2
Chairs: R. Velmurugan and K.E. Kazakov
14:00–14:20 G. Kuvyrkin, I. Savelyeva, and D. Kuvshinnikova, *Model of Non-Stationary Thermal Conductivity in a Curved Plate for a Structurally Sensitive Material*
14:20–14:40 A.V. Manzhirov, A.L. Popov, V.M. Kozintsev, A.L. Levitin, and P.S. Bychkov, *Experimental Research of Residual Stresses in AM Fabricated Parts*
14:40–15:00 A. Alekseev, *DMT technology applications for the industrial parts restoration in AETC IIET of RUDN*
15:00–15:20 Coffee Break
15:20–15:40 A.I. Prostomolotov, N.A. Verezub, and A.E. Voloshin, *Vortex Flows and Salt Transfer in Water-Salt Crystallizaters*
15:40–16:00 N. Sedyuh, *Hydrogenless carbon diamond-like coating, properties, application and features of production*
16:00–16:20 V.N. Hakobyan, E.P. Dats, E.V. Murashkin, and A.V. Sahakyan, *Contact Stresses Effects during Plastic Flow of Thermoelastic-Plastic Multilayered Spherical Solids*
16:20–16:40 M.N. Saushkin and V.P. Padchenko, *Reconstruction of Stress-Strain State in the Stress Concentrations of the Hollow and Solid Cylindrical Specimens*
16:40–17:00 V.N. Hakobyan, E.P. Dats, E.V. Murashkin, and A.V. Sahakyan, *Residual Stresses in Assemblage of Thermoplastic Circular Cylinders*

23 August 2018 (Thursday) 10:00–11:00
Poster Session
Chair: K.E. Kazakov and D.A. Parshin
10:00–11:00:
V.S. Zarubin, E.S. Sergeeva, and I.V. Magnitsky, *Comparative Analysis of Mathematical Modeling Methods on the Example of Polymer Composite Elastic Characteristics*
N.E. Stadnik, *Atherosclerotic Vessel Wall Simulation by an AM-Fabricated Cylinder*
T.K. Nesterov, *Boundary Elements Method in AM Modeling Problems*

A.A. Romanov, *Mesh Generation for Additive Manufacturing Problems Using Spring System Method*
M. Moolla, E. Akinlabi, and M.F. Erinosho, *Investigation of Laser Deposited Ti+TiB2 Composites for Microhardness and Microstructural Evolution*
M.F. Erinosho and E. Akinlabi, *Corrosion Behaviour of Laser Deposited Commercially Pure Titanium and Molybdenum in 3.5% NaCl Solution*
A.L. Popov, V.M. Kozintsev, A.L. Levitin, D.A. Chelyubeev, A.V. Chentsov, and P.S. Bychkov, *Application of the Probe Hole Method for Diagnostics of Shrinkage Stresses in Products of Additive Technologies*
E.V. Murashkin, *Finite Deformations Modelling for Materials with Complex Rheology and Related Problems*
D.A. Parshin, A.V. Manzhirov, N.K. Gupta, and R. Velmurugan, *Additive Manufacturing of Composite Materials*
A.V. Manzhirov, M.N. Mikhin, *Fabrication of Composite Prismatic Rods under Torsion*

24 August 2018 (Friday) 10:00–11:00
Oral Session 3
Chair: A.V. Manzhirov and E.V. Murashkin
10:00–11:00 Closing Ceremony

Report composed by Evgenii Murashkin

18-11 IUTAM Symposium on Mechanics of Electro/Magneto-Active Materials and Structures
Beijing, China, August 26 – August 30, 2018

Organizers: Daining Fang and Christopher Lynch

a) Scientific Committee
Daining Fang (Co-chair), Peking University, China; Christopher Lynch (Co-chair), UCLA, USA; Wei Yang, Zhejiang University, China; Zhigang Suo, Harvard University, USA; Nimal Rajapakse, Simon Fraser University, Canada; Jürgen Rödel, TU Darmstadt, Germany; Yasuhide Shindo, Tohoku University, Japan; Huajian Gao (IUTAM Representative), Brown University, USA

b) Short summary of scientific progress achieved
In the past two decades, the electro/magneto-active materials including ferroelectrics/ piezoelectrics, ferromagnetic materials, multiferroics, electro-active polymer (EAP) and related structures had been widely used and intensively investigated. The common features of these materials are that they show multi-field coupled behavior, e.g. electromechanical, magnetomechanical, or magnetoelectric responses. So far, great progresses had been got in this area but there still exists some challenges most of which are mechanics problems, such as the nonlinear constitutive laws, mechanical depolarization, large deformation, fracture and fatigue problems, etc. Meanwhile, in recent years, some new materials (say multiferroics) arose, new phenomena (say flexoelectricity) were observed, and new applications (say energy harvesting) were developed, which brings new opportunities and challenges to this area.

GENERAL OBJECTIVES: The aim of this symposium was to gather together the most active scholars in this exciting area to present the state-of-the-art research results and discuss the challenges and prospective of this area. Such a multidisciplinary symposium will look at the mechanics of E/M-active materials and structures from different perspectives, and thus advance mechanics and its applications in both academics and industries. The topics of this symposium include but are not limited to: 1) Domain switching in ferroelectrics/ferromagnetics; 2) Fracture and reliability; 3) Modeling and simulations; 4) Characterization of EM-active materials; 5) Multiferroics & Magnetoelectric composites; 6) Soft EM-active materials; 7) Flexoelectricity; 8) Energy harvesting system based on E/M-active materials/structures; 9) New applications of EM-active materials.

From the presentations at this Symposium, it can be concluded that the electro/magneto-active materials and structures had been playing important roles in many areas and the related mechanics should be further investigated. Besides the formal oral presentations, poster sessions were also arranged for domestic young

scholars during which the young scholars can have plenty of time to communicate with the established scholars in this field.

c) Countries represented and number of participants

The symposium had 74 participants from the following eight countries: China, USA, Germany, Israel, Denmark, UK, Japan, Canada.

d) Publication of Proceedings of the Symposium

All abstracts were distributed to the participants on a USB-stick. Selected full papers were recommended to submit to the IOP journal "Smart Materials and Structures".

e) Financial support

Totally 243k Chinese Yuan support got for this symposium.
120k Yuan from National Natural Science Foundation of China, 93k Yuan from State Key Laboratory for Turbulence and Complex Systems (LTCS) of Peking University, 30k Yuan from The Chinese Society of Theoretical and Applied Mechanics.

f) Scientific program

Day 1, Aug.27, Monday, Morning

8:30-9:00	Daining Fang, Christopher Lynch, Huajian Gao, Nimal Rajapakse, Dongxiao Zhang, Welcome Speech
Kicking off 9:00-9:30	Robert McMeeking, *Contraction of polymer gels created by the activity of molecular motors*
9:30-10:00	Group photos and coffee break
Invited talks 10:00-10:30	Biao Wang, *Microscopic piezoelectric theory and electromechanical coupling correlations in 2D piezoelectric crystals*
10:30-11:00	John Huber, *Prospects for energy harvesting using ferroelectric/ferroelastic switching*
11:00-11:30	Huajian Gao, *Hydrogen embrittlement in metallic nanowires*
11:30-12:00	Hiroki Kurita, *Evaluation of Vibration Energy Harvesting for Magnetostrictive Iron-Cobalt/Nickel 2-2 Composites*

12:00pm-1:30pm: working lunch and roundtable discussions

Day 1, Aug.27, Monday, Afternoon

1:30-2:00	Christopher Lynch, Phase *Field Modeling of Domain Effects in Nanoscale Multiferroic Heterostructures*
2:00-2:30	Yichun Zhou, *Flexibility and Multiferroic of PZT ferroelectric and its heterostructure*
2:30-3:00	Stephan Rudykh, *Instabilities in soft electro- and magneto-active composites*

3:00-3:30	Teng Li, *Rethink Wood: its Unconventional Applications in Advanced Material Design*
3:30-3:50	Coffee break
3:50-4:20	Fei Fang, *Hybridizing SWNT/PMMA/PVDF towards High-Performance Piezoelectric Nanofibers*
4:20-4:50	Jiangyu Li, *Probing Electromechanical Coupling at the Nanoscale: Opportunities, Challenges, and Outlooks*
4:50-5:20	Kyle Webber, *Adjusting the Residual Stresses in Functional Ceramic Films Deposited at Room Temperature with Aerosol Deposition*

5:30-6:30: Dinner

Day2, Aug.28, Tuesday, Morning

8:30-9:00	Zuoguang Ye, *Multi-scale domain structures and high piezo-/ferroelectricity in complex perovskite solid solutions*
9:00-9:30	Weiqiu Chen, *Tunable waves in a dielectric elastomeric phononic rod*
9:30-10:00	Hugh Simons, *Real-time, multi-scale 3D imaging of heterogeneity in ferroelectrics*
10:00-10:20	Coffee break
10:20-10:55	Wei Yang, *Mechanics for Multi-functional Soft Materials*
10:55-11:25	Pedro Ponte Castaneda, *Constitutive Models for Dielectric Elastomer Composites at Finite Strains: Dipolar Forces and Electric Torques*
11:25-11:55	Baixiang Xu, *Phase-field modeling of relaxor ferroelectrics*

12:00pm-1:30pm: working lunch and roundtable discussions

Day2, Aug.28, Tuesday, Afternoon

1:30-2:00	Tongyi Zhang, *Stress-induced Pseudo-First-Order Phase Transition in Perovskite Ferroelectrics & Ultrahigh Positive/Negative Electrocaloric Effects*
2:00-2:30	Oscar Lopez-Pamies, *Deformable Dielectrics Containing Space Charges: A Pathway Towards Materials with Extreme Electromechanical Properties*
2:30-3:00	Shengping Shen, *Probing flexoelectricity via shock wave and beyond*
3:00-3:40	Coffee break and Poster session I
3:40-4:10	Jiawang Hong, *Beyond piezoelectricity: Flexoelectricity and its effect on the nanostructures*

4:10-4:40	Cunfa Gao/Yan Shi, *Assembly of Isolated Three-Dimensional Origami Structures and Their Applications*
4:40-5:10	Shawn Chester, *Electro-mechanical modeling of dielectric viscoelastomers*

6:30-8:30: Banquet

Day3, Aug.29, Wednesday, Morning

8:30-9:00	Andreas Ricoeur, *A condensed approach for the modeling of polycrystalline constitutive behaviors of heterogeneous ferroic multiphase functional materials*
9:00-9:30	Yihui Zhang, *Morphable 3D mesostructures and microelectronic devices by multistable buckling mechanics*
9:30-10:00	Go Murasawa, *Poly(vinylidene fluoride) film fabrication and its printing system*
10:00-10:40	Coffee break and POSTER Session II
10:40-11:10	Wei Hong, *Mechanics of a Magneto Self-Healing Soft Composite*
11:10-11:40	Jayasimha Atulasimha, *Energy efficient computing with strain mediated voltage control of magnetism*
11:40-12:10	Manura Liyanage/Nimal Rajapakse, *Multi-scale simulation of hydrogen diffusion in lead zirconate titanate*

12:10pm-1:10pm: working lunch and roundtable discussions

Day3, Aug.29, Wednesday, Afternoon

1:10-1:40	Sergii Kozinov, *Simulation of fracture process zone in ferroelectric materials*
1:40-2:10	Huadong Yong /Youhe Zhou, *Thermo-magneto-electro-elastic behaviors in high temperature superconductors*
2:10-2:40	Jie Wang, *Phase field modeling of ferroelectric materials with flexoelectricity through isogeometric analysis*
2:40-3:10	Ziguang Chen /Yuantai Hu, *An intermediate homogenization approach for electromechanical peridynamic modeling of damage sensing in nanocomposite bonded explosive materials*
3:10-3:30	Poster session III and coffee break
3:30-5:00	Visit PKU history Museum and Discussions

5:30-6:30: Dinner

Day4, Aug.30, Thursday, Morning

8:30-9:00	Kaushik Bhattacharya, *Ferroelectrics as semiconductors*

9:00-9:30	Yihui Zhang, *Morphable 3D mesostructures and microelectronic devices by multistable buckling mechanics*
9:30-10:00	Jin Zhang/Zheng Zhong, *Piezoelectrically tunable mechanical properties of two-dimensional piezoelectric materials*
10:00-10:20	Coffee break
10:20-10:50	Lalitha Kodumudi Venkataraman, *Prototype relaxor ferroelectric composite exhibiting electromechanical hardening and delayed thermal depolarization*
10:50-11:20	Faxin LI /Daining Fang, *Giant actuation strain over 0.5% in periodically orthogonal poled PZT ceramics and multilayer actuators via reversible domain switching*
11:20-11:30	Daining Fang and Christopher Lynch, Closing

11:40am-1:00pm: working lunch and departure.

Poster Presentations

Session I, Day 2-Aug.28 (Tue), Afternoon, 3:00-3:40
P1: Yongmao Pei, *Magnetic-control multifunctional membrane-type acoustic metasurface for reflected wave manipulation*
P2: Xingyi Zhang, *Nonuniform-stresses in high temperature superconducting thin films*
P3: Qun Li, *Interactions between domain switching and ferroelectric creep by phase field simulation in the interdigital electrodes*
P4:Yajun Zhang, *Giant magnetoelectric effect at the graphone/ferroelectric interface*
P5: Tiefeng Li, *Electromechanical modeling and control of soft robotic fish*
P6: Shouhu Xuan, *Conductive-Magnetic Coupling PDMS/CNT/CIP Porous Composites As A Strain and Magnetic Field Bi-Sensor*
P7: Zhenghua Qian, *Forced vibration analysis of FBAR based on two-dimensional equations*

Session II, Day 3-Aug.29 (Wed), Morning, 10:00-10:40
P8: Tongqing Lu, *Dielectric gel for high sensitivity touch sensor*
P9: Yunya Liu, *Analyzing and simulating ferroelectrics probed by piezoresponse force microscopy*
P10: Weiguo Mao, *Study of mechanical-magnetic and electromagnetic properties of BNT/NFO film systems by a novel bulge technique*
P11: Haomiao Zhou, *Mechanical loss in converse magnetoelectric effect under different driving voltage and temperature*
P12: Liwu Liu, *Instability and thermodynamics of Dielectric Elastomers*

P13: Hongjun Yu, *An interaction integral method for crack analysis in ferroelectrics under large-scale domain switching*

Session III, Day 3-Aug.29 (Wed), Afternoon, 3:10-3:45
P14: Yingwei Li, *A cement-based 1-3 piezoelectric composite sensor working in d15 mode for charactering the shear stress in civil engineering structure*
P15: Hao Zhou, *Characterization Method of Flexoelectricity by Nanocompression*
P16: Yangfan Hu, *Magnetoelastic phenomena and mechanisms of magnetic skyrmion crystal*
P17: Jici Wen, *Stress evolution in elastic-plastic electrodes during electrochemical-mechanical coupling*
P18: Qiang Huan, *Structural health monitoring based on omni-directional SH wave piezoelectric transducers*

Report composed by Daining Fang and Faxin Li

18-12 IUTAM Symposium on Stochastic Dynamical Systems Approaches to Fluid Flow Transitions
Ithaca, USA, September 12 – September 14, 2018

WEBSITE: http://www.staff.science.uu.nl/~dijks101/iutam
Organisers: Henk Dijkstra (Utrecht University) and Paul Steen (Cornell University)

a) Scientific Committee
Detlef Lohse (Netherlands), Michael Ghil (France), Valerio Lucarini (UK), Adam Monahan (Canada), Themis Sapsis (USA), Paul Steen (USA), Bruno Eckhardt (Germany), Henk Dijkstra (Netherlands, chair), Nadine Aubry (USA, IUTAM Representative).

b) Short summary of scientific progress achieved
Transition phenomena in flows of liquids and gases are of great fundamental interest from those occurring in microfluid flows to those in the large-scale atmospheric and oceanic circulation. Transitions in industrial and environmental flows are also of great practical interest. Dynamical systems approaches, such as bifurcation theory, have provided cornerstone analyses methods to study linear instabilities and subsequent nonlinear behavior. In the fluid dynamics community, these methods are considered to be useful either for low-dimensional models of the transition phenomena or for simple transitions (symmetry breaking, oscillatory instabilities) in high-dimensional deterministic models.

Over the past decade, many new techniques have been developed to deal with complex transition phenomena in high-dimensional stochastic models. These range from novel numerical methods, such as dynamical orthogonal field methods, to techniques from ergodic theory, such as transfer and Koopman operator estimation. These techniques enable the study of the mechanisms of much more complicated transition phenomena, such as the so-called wind-reversals in turbulent Rayleigh-Bénard convection.

The symposium brought together different groups working on method development as well as on applications. Participants had backgrounds ranging from (applied) mathematics, to engineering and (climate) physics. There were lively discussions on the mathematical and numerical aspect of new analysis methods of stochastic dynamical systems. In addition, there was much exchange on experience of these new methods regarding applications in fluid dynamics and climate research.

c) Countries represented and number of participants
During the symposium, about 25 scientists gathered at La Tourelle and Cornell University (Ithaca, NY) to present work on the topic of the IUTAM symposium. The participants were drawn from 10 countries as follows: Netherlands (2), United

Kingdom (1), Germany (1), United States (15), France (1), India (1), Australia (1), Denmark(1), Belgium (1) and Canada (1). Two of the sessions (one on `Engineering applications (at CBE)' and one on `Challenges (at CAM)') were held on the Cornell University Campus to involve more of the Cornell University students and faculty. During these sessions additional people (at least 10 at CBE and at least 20 at CAM) attended the talks, in particular the ones by Screenivasan (CBE) and Kevrekidis (CAM).

d) Publication of Proceedings of the Symposium
None

e) Financial support
Support: 3.5 k$ from IUTAM, 5 k$ from NSF and 10 k$ from Cornell University.

f) Scientific program
Wednesday 9/12
Session 1, La Tourelle: Mathematics of transitions in stochastic systems (Chair: Froyland)
9:00-9:45 Jason Frank, *A Detectability Condition for Data Assimilation*
9:45-10:30 Shouhong Wang, *Dynamic Transition Theory for Deterministic and Stochastic Systems*
11:00-11:45 Valerio Lucarini, *Melancholia states in the climate system: exploring global instabilities and critical transitions*
11:45-12:30 Honghu Liu, *Markovian and Non-Markovian Closures for Stochastic PDEs based on Parameterizations*

Session 2, La Tourelle: Application to fluid flow transitions (Chair: Peinke)
2:45-3:30pm Freddy Bouchet, *Rare transitions and extreme events in geophysical turbulent flows and climate*
4:00-4:45pm Gary Froyland, *Transfer operator methods for analysing coherence and mixing in turbulent and geophysical flows*
4:45-5:30pm Pedram Hassanzadeh, *Predicting short-term evolution and long-term response of geophysical turbulence*

Thursday 9/13
Session 3, La Tourelle: Application to (geophysical) turbulence (Chair: Graham)
9:00-9:45 Juan Restrepo, *Stochastic Parametrization of Wave Breaking Transport and Dispersion*
9:45-10:30 Erik van Vleck, *Projected Data Assimilation*
11:00-11:45 Joachim Peinke, *High precision results for turbulence*
11:45-12:30 Themis Sapsis, *Are extreme dissipation events predictable in turbulent fluid flows?*

Session 4, Cornell University: Application to engineering (JC Smith session, Chair: Steen)
2:10pm - 2:15pm welcome + introduction Sreenivasan Katepalli
2:15pm - 3:15pm keynote talk: Sreenivasan Katepalli, *Unusual aspects of solar convection*
3:15pm - 3:45pm Break with Posters
3:45pm - 4:30pm Don Koch, *A clustering instability of homogeneously sheared particle-laden flows*
4:30pm - 5:15pm Mike Graham, *Nonlinear transition and maximum drag reduction in viscoelastic polymer solutions*
5:15 – 5:45pm Break with Posters
5:45pm - 6:30pm Yong Joo, *Mesoscale Modeling of Electrohydrodynamic Instabilities*

Friday 9/14
Session 5, La Tourelle: Application to climate dynamics (Chair: Restrepo)
9:00-9:45 Stephane Vannitsem, *Is ocean surface wind stress key in the long term predictability of the atmosphere?*
9:45-10:30 Peter Ditlevsen, *Dramatic transitions observed in geophysical flow of the past*
11:00-11:45 Amit Apte, *Markov random field model for the Indian monsoon rainfall*
11:45-12:30 Adam Monahan, *Regime Dynamics of the Stably Stratified Nocturnal Boundary Layer*

Session 6, Cornell University (PSB 401): Challenges (CAM session, Chair: Monahan)
2:30-3:15pm John Guckenheimer, *The (Un)predictability of El Niño*
3:30-4:30pm Yannis Kevrekidis, *No equations, no variables, no parameters, no space, no time: Data and the modeling of complex systems*

Report composed by Henk Dijkstra

18-13 IUTAM Symposium on Architectured Material Mechanics
Chicago, USA, September 17 – September 19, 2018

WEBSITE: https://engineering.purdue.edu/IUTAM2018AMS/

Organizers: Thomas Siegmund (Purdue University, West Lafayette, Indiana, USA) and Francois Barthelat (McGill University, Montreal, Canada)

a) Scientific Committee
Francois Barthelat (McGill University, CAN), Markus Buehler (MIT, USA), Oliver Bouaziz (Universite de Lorraine, FR), Vikram Deshande (University fo Cambridge, UK). Yuri Estrin (Monash University, AUS), David Embury (McMaster University, CAN), Otmar Kolednik (Austrian Academy of Sciences, AT), Viggo Tvergaard (IUTAM Representative, Technical University of Denmark, DK)

b) Short summary of scientific progress achieved
GENERAL OBJECTIVES:
Architectured materials are an emerging and exciting class of materials with the promise of advantageous performance and multifunctional properties. These materials are characterized by specific and periodic structural features which are larger than what is typically considered a microstructural length scale (such as a grain size) but smaller than the size of the final component made of the architectured material. This class of materials includes but is not limited to lattice materials and cellular material systems, dense material systems composed of building blocks of well-defined size and shape.

The key characteristic distinguishing architectured materials from other materials is their very high morphological control, and architectured materials can therefore be considered high information materials. The tight control of the morphological characteristics allows to predefine and control specific mechanisms of local stress transfer, elastic/plastic buckling, gliding of building blocks or propagation of cracks along predefined paths. Well-designed architectured materials can generate new and attractive combinations of properties which can be programmed in the material. In particular, the empty spaces and gliding interfaces contained in architectured materials can be exploited to overcome the theoretical bounds that apply to monolithic materials.

This IUTAM symposium provided a state of the art on the engineering science of architectured materials and focus on the mechanics, design, fabrication and mechanical performance of all categories of architectured materials including lattice materials, metamaterials, multilayered system and topologically interlocked materials.

The symposium included a total of 41 invited presentations over three days, and organized in three focused areas:

- Focus 1: Design, optimization and fabrication (15 presentations in four sessions)
- Focus 2: Bioinspiration, strength and toughness (13 presentations in four sessions)
- Focus 3: Heterogeneity, instability, shape transformation and dynamical behavior (15 presentations in four sessions)

In addition we held:

- Two extended poster sessions with a total of 43 poster presentations. The topics of poster presentations were in line with the three main session themes.
- A three-day exhibit with samples of architectured materials, mechanical metamaterials, snapping materials and topologically optimized structured (the samples were provided by the participants and were available for hands-on discussion during the meeting).

SPECIFIC PROGRESS ACHIEVED:

On the theme of design, optimization and fabrication of architecture materials the symposium offered a review of past developments and summary of current advances in architectured materials and their application. Sessions included discussion on topics of topology optimization, periodic truss structures, origami materials, active architecture materials, knit-process materials, macro-micro-and nanoscale concepts, and on material assembly concepts.

On the theme of bioinspiration, strength and toughness of architecture materials the symposium sessions focused on achieving novel material configurations, such as nacre architecture, interlocked geometries, auxetics, and lattice configurations, with exceptional toughness and underlying mechanics principles. Speakers discussed applications in biomedical devices and in material systems for impact protection.

On the theme of heterogeneity, instability, shape transformation and dynamical behavior of architectured materials the symposium sessions focused on topics of wave propagation and band gaps, phase transformation and instabilities, on active material concepts and the issue of non-reciprocity in architecture materials.

The symposium brought together researchers from materials science, mechanical engineering, mathematics and physics. The discussions taking places between the presentations were fruitful and stimulating.

c) Countries represented and number of participants

89 researchers from 18 countries (Austria, Canada, China, Denmark, France, Germany, Israel, Poland, Argentina, China, Korea, Switzerland, The Netherlands,

Spain, Sweden, Switzerland, United Arab Emirates, United States) attended the conference. Of the total attendance, 32 participants were either graduate students or post-doctoral researchers.

d) Publication of Proceedings of the Symposium

A special issue of the ASME Journal of Applied Mechanics with the title "Architectured Materials Mechanics" is currently in production and slated for publication in the last quarter of 2019. The guest editors are Thomas Siegmund and Francois Barthelat under guidance of the journal editor Yonggang Huang. The special issue will contain 14 articles expanding on the respective presentations at the symposium.

Abstracts of all contributions to the symposium are available electronically at https://docs.lib.purdue.edu/iutam/.

e) Financial support

The symposium was supported with $5,000 from IUTAM. The organizers also acknowledge the financial support by the National Science Foundation under Award #1820220 which allocated $14,725 to enable reduced registration fees for graduate students and post-doctoral research associates and covered the cost of the poster sessions.

f) Scientific program

Oral Presentations

Focus 1: Design, optimization and fabrication

1. Yves Brechet: *Architectured Materials: 15 Years of Progress, and Emerging Challenges*
2. Ole Sigmund, Jeroen Groen: *Extremal Material and Structure Design by Topology Optimization*
3. Heinrich M. Jaeger, Kieran A. Murphy, Leah K. Roth: *Architectured Particulate Materials*
4. Frank Zok, Matthew R. Begley, Ryan M. Latture: *Design and Performance of Periodic Trusses*
5. Julian J. Rimoli, Hossein Salahshoor, Raj Kumar Pal: *Topology Matters: Expanding the Design Space of Lightweight Mechanical Metamaterials*
6. Rafael Estevez, Alexis Faure, Georgios Michailidis, Charles Dapogny, Grégoire Allaire: *Shape and Topology Optimization of Architectured Materials: From the Design to Real Structures*
7. Antonios Kontsos: *The Behavior of Knitted Textiles through the Lens of Architectured Material Mechanics*
8. Greg N. Frederickson: *Hidden in Plane Sight: the Extraordinary Vision of Ernest Irving Freese*

9. Julia R. Greer, Lucas Meza, Arturo Mateos, Carlos Portela, Dennis Kochmann, Yong-Wei Zhang: *Mechanics of Three-Dimensional Nano-Architected Meta-Materials*
10. Yonggang Huang: *Mechanics-guided Deterministic 3D Assembly*
11. SungWoo Nam: *Mechanical Instability-driven Architecturing of Atomically-thin Materials*
12. Jie Yin: *Kirigami-based Mechanical Metamaterials*
13. Andres F. Arrieta, Jakob Faber, Katherine S. Riley, André R. Studart: *Extending Origami: Crease Pre-stressing for Functional Adaptation*
14. A. Mocci, D. Codony, A. Abdollahi, I. Arias: *Flexoelectricity-based Electromechanical Metamaterials*
15. Kunal Masania, André Stuart: *3D Printing of Biologically-inspired Materials*

Focus 2: Bioinspiration, strength and toughness

1. Zdeněk P. Bažant, Wen Luo: *Fishnet Statistics for Failure Probability of Nacreous Staggered Laminar Materials*
2. Francois Barthelat: *Exploring Material Property Space Using Bioinspiration and Architecture*
3. H. Daniel Wagner, Israel Greenfeld, Wenyong Zhang, XiaoMeng Sui: *Intermittent Interfaces: Bioinspired Strategies Towards Material Resilience*
4. Iwona Jasiuk, Fereshteh A. Sabet, Christopher Kozuch, Diab Abueidda, Frances Su, Joanna McKittrick: *Bioinspired Architectured Materials with Interpenetrating Phases*
5. Sung Hoon Kang, Galip Ozan Erol, Emilio Bachtiar, Azra Horowitz: *Architected Cardiovascular Implants for Accommodating Growth*
6. Nan Hu, Hanqing Zhang, Daobo Zhang, Peng Feng, Amal Jerald Joseph M, Davut B. Gul: *Tunable Failure in Non-periodic Architected Materials Inspired by Physarum Polycephalum Growth*
7. Stavros Gaitanaros: *Random Foams: Instabilities, Fracture and Shocks*
8. Oliver Tessmann, Andrea Rossi: *Parametric and Combinatorial Topological Interlocking Assemblies*
9. Thomas Siegmund: *Topologically Interlocked Material Systems: From a Material Design Concept to Properties*
10. Catalin R. Picu, Anirban Pal: *Interlocked Fragmented Continua: A Stochastic Metamaterial*
11. Thomas Tancogne-Dejean, Marianna Diamantopoulou, Colin Bonatti, Maysam Gorji, Dirk Mohr: *Plastic Anisotropy of Elastically-isotropic Beam, Shell and Plate Networks: Theory and Experiments*
12. Tiantian Li, Lifeng Wang: *Exploiting Auxetics to Design Composite Materials with Enhanced Mechanical Performance*
13. Frédéric Albertini, Justin Dirrenberger, Andrey Molotnikov, Cyrille Sollogoub: *Mechanical Behaviour of Architectured Auxetic Hybrid Lattice Structures*

Focus 3: Heterogeneity, instability, shape transformation and dynamical behavior

1. Rod Lakes: *Extreme Classical and Nonclassical Physical Properties in Heterogeneous Materials*
2. Otmar Kolednik, Roland Kasberger, Masoud Sistaninia: *Design of Damage-tolerant and Fracture-resistant Materials by Utilizing the Material Inhomogeneity Effect*
3. Gerold A. Schneider, Berta Domènech, Diletta Giuntini, Büsra Bor: *Organically Linked Nanoparticles as Building Blocks for Architectured Materials*
4. C. Ayas, W.E.D Nelissen, C. Tekoglu: *2D Lattice Materials for Low Energy Actuation*
5. Corentin Coulais: *Non-reciprocity in Mechanical Metamaterials*
6. Amr Farag, Hang Xu, Damiano Pasini: *Thermally Actuated Planar Lattices with High Fractal Stiffness*
7. Yanyu Chen: *3D Printed Hierarchical Honeycombs with Shape Integrity under Large Compressive Deformations*
8. Katia Bertoldi: *Architected Materials: From Reconfigurability to Nonlinear Waves*
9. Pablo D. Zavattieri, Yunlan Zhang, Miriam Velay, David Restrepo, Nilesh D. Mankame: *Architecting Stress- and Temperature-Induced Phase Transformation*
10. Stephan Rudykh, Viacheslav Slesarenko, Pavel Galich, Jian Li: *Micromechanics and Instabilities of Soft Architectured Composite Materials*
11. Kathryn H. Matlack, Ignacio Arretche: *Dynamic and Mechanical Properties of Lattice-Resonator Meta-Structures*
12. G.L. Huang: *Wave Propagation in Modulated Phononic Crystals and Metamaterials*
13. Kuo-Chih Chuang, Xiang Fang, Zhiwen Yuan: *Forming Flexural Band Gaps of Phononic Crystal Beams Based on Concentrated Masses*
14. A. Srikantha Phani: *Vibroacoustic Response of Lattices: Opportunities and Challenges*
15. Jaejong Park, Alok Sutradhar: *Design of Tunable Architectured Metamaterials for Biomedical Applications*

Poster Contributions

1. Bill Arrighi, Jun Kudo, Dan Tortorelli, Seth Watts, Dan White: *Three-Dimensional Multiscale Design Using Neural Net Surrogate Models of Lattice Material Response*
2. Kieran A. Murphy, Heinrich M. Jaeger: *Designed to Fail: Granular Plasticity and Particle Shape*
3. Vince Vernacchio, Thomas Siegmund: *Lattice Structures and Strength Optimization*

4. Diab W. Abueidda, Iwona Jasiuk, Nahil A. Sobh: *Acoustic Band Gaps, Sound Attenuation, and Elastic Stiffness of PMMA Cellular Materials Based on Triply Periodic Minimal Surfaces*
5. Sree Kalyan Patiballa, Girish Krishnan: *Conceptual Design of Spatial Auxetic Microstructures*
6. MS. Hosseini, S.N. Garner, S. E. Naleway, J.M. McKittrick, P.D. Zavattieri: *Role of Architecture in Controlling Crack Propagation Direction Bio-Inspired From Boxfish Scute*
7. Will Langford, Neil Gershenfeld: *Discretely Assembled Compliant Mechanisms*
8. Susanta Ghosh, Mark Coldran, Praveen Bulusu, Upendra Yadav, Trisha Sain: *Mechanics of Micro-Architectured Glass: Inverse Identification of Interface Properties and a Novel Analytical Model*
9. Thomas Tancogne-Dejean,and Dirk Mohr: *BCC Metamaterials Composed of Tapered Beams: Stiffness and Energy Absorption*
10. Aman Thakkar, Nilesh Mankame, Pablo Zavattieri, Andres F. Arrieta: *Energy Harvesting in Phase Transforming Materials*
11. H. Cui, M.R. O'Masta V.S. Deshpande, Xiaoyu (Rayne) Zheng: *Fracture Toughness of Hierarchical, Low Density Architected Metamaterials*
12. Yunlan Zhang, Kristiaan Hector, Mirian Velay-Lizancos, David Restrepo, Nilesh D. Mankame, Pablo Zavattieri: *Mechanics of Energy Absorbing Phase Transforming Cellular Materials*
13. Di Wang, Alireza Zaheri, Benjamin Russell, Pablo Zavattieri, Horacio Espinosa: *Fiber Reorientation Behavior of Bioinspired Bouligand Architectures with Functional Graded Fiber Orientation*
14. Myungwon Hwang, Andres F. Arrieta: *Input-Independent Response-Invariant Wave Propagation in Bistable Lattices with Elastic Interactions*
15. Carlos M. Portela, Dennis M. Kochmann, Julia R. Greer: *Controlling the Effect of Nodes on the Mechanical Response of Lattice Architectures*
16. Muhammed Imam, Trisha Sain, Julien Meaud: *Computational Design of Architectured Materials with Hierarchical Interlocking for Improved Multifunctional Properties*
17. Andres Bejarano, Christoph Hoffmann: *Topological Interlocking Cylinder Configurations: A Geometric Approach*
18. Miroslawa El Fray, Rahul Sahay, XiaoMeng Sui, H. Daniel Wagner: *Architectured Helically Coiled Structures Through Novel Electro-writing Technique*
19. Hang Xu, Amr Farag, Damiano Pasini: *Routes to Program Thermal Expansion in Three-dimensional Lattices Built from Tetrahedral Building Blocks*
20. Pu Zhang: *Symmetry of Phonon Modes for Periodic Structures with Glide Symmetry*
21. Baig Al-Muhit, Florence Sanchez: *Mechanical Properties of Nanolaminate Tobermorite-9Å/Graphene Composite*

22. Lichen Fang, Jing Li, Zeyu Zhu, Santiago Orrego, Sung Hoon Kang: *Piezoelectric Polymer Thin Films with Architected Cuts*
23. Haodong Du, Liang Zhang, Bo Peng, Wenbin Yu: *Constitutive Modelling of Cosserat Metamaterials*
24. Xiao Shan, Lu Liu, Ahmad Rafsanjani, Damiano Pasini: *Durable Bistable Auxetics Made of Rigid Solids*
25. Mohammad Mirkhalaf, Tao Zhou, Florent Hannard, Francois Barthelat: *Strong and Tough Ceramics Using Architecture and Topological Interlocking*
26. Qianli Chen, Ahmed Elbanna: *Emergent Wave Phenomena in Coupled Elastic Bars: From Extreme Attenuation to Realization of Elastodynamic Switches*
27. J. William Pro, Najmul Abid, Ali Shafiei, Francois Barthelat: *Discrete Element Models of Architectured Biological and Bio-inspired Composites*
28. Marianna Diamantopoulou, Colin Bonatti, Dirk Mohr: *Periodic Ceramic-Polymer Shell-Network of High Specific Stiffness*
29. Mirit Sharabi, H. Daniel Wagner: *Bio-mimetics of Structural Micro-mechanisms in Soft Composite Materials*
30. Howon Lee, Chen Yang, Manish Boorugu: *Lightweight Microlattice with Tunable Mechanical Properties Using 3D Printed Shape Memory Polymer*
31. Michael Jandron, David Henann: *A Numerical Simulation Capability for Electroelastic Wave Propagation in Dielectric Elastomer Composites: Application to Tunable Soft Phononic Crystals*
32. Ye-eun Na, Dahye Shin, Kisun Kim, Seokwoo Jeon, Dongchan Jang: *Emergence of New Density-Strength Scaling Law in 3D Hollow Ceramic Nano-Architectures*
33. Andrew Williams, Thomas Siegmund: *Tesselations and Percolations in Topologically Interlocked Stereotomic Material Systems*
34. Colin Bonatti, Dirk Mohr: *Mechanical Response of Three Cubic Shell-based Metamaterials*
35. Amrita Kataruka, Shelby B. Hutchens: *Analysis of Plant-inspired, Osmosis-mediated Structures*
36. Vanessa Restrepo, Miriam Velay, Pablo Zavattieri: *Structural Interfaces Bioinspired by Natural Adhesives: New Self-healing Material with High Energy Dissipation*
37. Catalin R. Picu: *Architected Fibrous Networks with Highly Tuneable Properties*
38. Christine E. Gregg, Benjamin Jenett, Kenneth C. Cheung: *Assembled Composite Lattice Structures: Towards Ideal Performance in Large-Scale Applications*
39. Le Cao: *Multiscale Method in Lattice Structures Stability Analysis with Topology Optimization*
40. Caglar Oskay, Ruize Hu: *Multiscale Simulation Framework for Transient Wave Propagation in Viscoelastic Composites*

41. Davis J. McGregor, Sameh Tawfick, William P. King: *Mechanical Properties of Hexagonal Lattice Structures Fabricated Using Continuous Liquid Interface Production Additive Manufacturing*
42. Josh Pribe, Thomas Siegmund: *Architecture and Internal Material Length Scale: Fatigue Crack Growth Across Weak Interfaces*
43. Kamran Khan: *Architected Active Metamaterials*

Report composed by Thomas Siegmund

18-14 IUTAM Symposium on When Topology Optimization Meets Additive Manufacturing – Theory and Methods
Dalian, China, October 8 – October 12, 2018

WEBSITE: http://www.iutam2018.org/
Organizers: Gengdong Cheng (chairman, DLUT) and Jun Yan (Secretary-General, DLUT)

a) Scientific Committee
Gengdong Cheng, China; Niels Olhoff (IUTAM Representative), Denmark; Ole Sigmund, Denmark; Pierre Duysinx, Belgium; Wei Chen, USA; Xu Guo, China; Wing Kam Liu, USA.

b) Short summary of scientific progress achieved
Topology optimization, which aims at designing innovative and lightweight products by distributing material within a prescribed domain in an optimal way, has reached a certain level of maturity and becomes a well-established research area. One of the problems associated with topology optimization is, however, that the optimized structures may have very complex geometries that cannot be manufactured easily with use of traditional (subtractive) manufacturing approaches. Recently, with the emergence of a new manufacturing technology- additive manufacturing (AM), the aforementioned difficulty can be overcome to a large extent by manufacturing a structure in an additive way. This new manufacture technique has great potential to enable the realization of optimal structures irrespective of their geometry complexity and take full advantage of topology optimization. However, a series of challenging issues still exist in both theoretical and methodology aspects.

The participants of the symposium, including researchers in both topology optimization and additive manufacturing fields show their new achievement in the theory, method and industrial application, identify the challenging issues for integration of two areas and present their answers based on their own research and interactive discussion during the symposium. For example, a number of new frameworks for AM oriented topology optimization are presented, including the approach with explicit geometry description. Several new shape and topology optimization models and methods subjected to manufacturing constraints (e.g., eliminating enclosed voids from designs, restriction of overhang degrees, controlling minimum structural feature sizes) are developed, including simultaneous design of structure and infill for additive manufacturing. Effective material property prediction theories without separation of scales is presented; Multi-physics/multi-scale numerical simulation of the additive manufacturing process and its simplified integration into topology optimization is presented; AM and meta-material design

through topology optimization and integrate material and structure design through AM and topology optimization are developed.

The symposium contains 25 oral presentations and 14 poster presentations, and it attracts 48 participants from 10 countries. The symposium covers a wide range of interesting and timingly topics in the field of topology optimization, additive-manufacturing-oriented design and their interfaces. The contents of the scientific program can be roughly classified into three categories.

1) Development of the subject of topology optimization in line with Additive Manufacture

The fast development of additive manufacture techniques also poses demands on improvement in the theories and algorithms of topology optimization. Professor Gengdong Cheng introduced their progress in the Sequential Quadratic/Linear Integer Programming (SQIP/SLIP) approach, which deals with the discrete variable nature of topology optimization directly and avoid many well-known troublesome problems due to the intermediate density in traditional topology optimization process. Professor Ole Sigmund from Technical University of Denmark, and his collaborator Dr. Jun Wu from Delft University of Technology, reported separately their approach in the design of infill graded microstructures with the use of projection method. Professor Xu Guo from Dalian University of Technology systematically updated their recent progress in the topology optimization approach based an explicit geometry description, the Moving Morphable Components (MMC) method. Professor Wei Chen from Northwestern University in U.S. introduced a concurrent optimization strategy and discussed combing the mathematical homogenization theory with the concept of connected morphable component (CMC). Professor Liang Gao from Huazhong University of Science and Technology elaborated their approach for optimizing shell-infill structures described by a distance regularized parametric level-set function. Professor David Rosen introduced their progress of designing multiscale and multimaterials structures, and their major focus is the design of fiber-reinforced composites with complex shapes. The optimization of such hybrid fibre reinforced composites also been studied by Professor Helder C. Rodrigues from Laeta-Associated Laboratory for Energy, Transports and Aeronautics in Portugal, who reported their research progress in the symposium. Professor Mathias Wallin from Lund University introduced their research progress in the topology optimization of non-linearly-elastic structures. Professor Jun Yan from Dalian University of Technology introduced the parallel treatment in concurrent topology optimization structures constituting of lattice configurations, whose single-scale simulation cost would be too high to afford. Professor Shikui Chen introduced their recent progress in incorporating the concept of conformal mapping into a generative design framework using level-set-based topology optimization approaches. Dr. Linwei He from University of Sheffield proposed a new design method by

sketching the boundaries of a structure with discrete but interconnected lines, and the method is found more efficient in designing truss-like forms.

2) Resolution of challenging issues in topology optimisation oriented from additive manufacturing

From an application viewpoint, existing topology optimization algorithms need reconstruction so as to help circumvent many limiting issues that have yet been technologically resolved at the current stage of additive manufacturing development. Professor Wing Kam Liu shared his vision in data-driven microstructural and mechanical design, and presented a demonstrative model of capturing the liquid-gas interface during the direct metal deposition additive manufacturing process. Professor Shutian Liu proposed a virtual-temperature method so as to ensure the self-connectivity of an optimized structure. Professor Weihong Zhang incorporated the printing direction into the topology optimization framework, and developed algorithms that can theoretically output self-support structures. Dr. Oded Amir from Technion – Israel Institute of Technology introduced their topology optimization formulation to overcome the overhang limitation induced by additive manufacturing. Professor Pierre Duysinx from University of Liege introduced the issues of interest concerning the Electron Beam Melting (EBM) and Selective Layer Manufacturing (SLM) processes in the AERO+ research project, as well as their works in devising a numerically efficient aggregation approach to account for the additive manufacturing constraints. Dr. Lucas Jakabcin from Ecole Polytechnique, a coworker of Professor Gregoire Allaire, discussed their models and results of minimizing the thermal deformation or the thermal residual stresses induced by the selective laser melting processes, which is modeled in a simplified way. Professor James K. Guest from Johns Hopkins University discussed embedding an overhang constraint within the topology optimization framework such that designed components and structures may be manufactured without the use of support material. Dr. Nicolo Pollini from Technical University of Denmark reported their recent developments in topology optimization of heat sinks passively cooled by natural convection.

3) Application of novel design approaches employing additive manufacturing techniques

The onset of additive manufacturing techniques opens a door for the design of advanced functional materials/structures. Professor Huaming Wang from Beihang University introduced his experience in designing high-performance, large, critical metallic components of industrial equipment in a way that shares similar underlying idea with additive manufacturing. Professor Weili Song from Beijing Institute of Technology presented several novel design results obtained by Professor Daining Fang's research group, especially in designing smart structures with 4D printing. Dr. Ming Zhou from Altair Engineering reported their progress in developing software environment for producing the digital twin of additively

manufactured structures. Dr. Jiyuan Ye from Electron Optical Systems Corporation in Shanghai discussed the impacts of material properties, design restrictions, cost and efficiency arising in the Direct Metal Laser Sintering process (DMLS). Dr. Xianghai Chai from AVIC Commercial Aircraft Engine reported their needs in the scratch analysis and optimization design for fan blade and case of aero engines.

To further clarify the frontier and research opportunities at the interface between topology optimization and the additive-manufacturing-oriented design, a panel discussion co-chaired by Wing Kam Liu and Xu Guo was held before the symposium concluded. Four panelists, Wei Chen, Ming Zhou, Ole Sigmund and Gengdong Cheng, along with one of the session chairs, Wing Kam Liu were firstly invited to share their vision in the subject by bulletin points, and the discussion was then heated up among all participants. Several issues were highlighted amid the discussion, including "development of the subject of topology optimisation on a multiscale basis", "additive-manufacturing-related problems for mechanicians, such as modelling uncertainties, spatial variance in products, optimisation of printing paths", "potential of artificial intelligence and machine learning techniques for topology optimisation", etc. A number of insightful comments were made, which are summarized in greater detail in the discussion note.

This IUTAM symposium provides a great chance for academic and industrial researchers in the related field to thoroughly exchange their thoughts over the subject. During this almost one-week event with a limited number of participants, attendees have got relatively sufficient time to conduct iterative discussion. Many participants felt their vision in the area expanded after the event, especially for the junior researchers taking part in the symposium.

GENERAL OBJECTIVES: The symposium aims to promote the interactions among top level researchers working in the area of topology optimization and AM. The central theme is to discuss the challenging issues and the corresponding solution approaches when topology optimization meets AM.

c) Countries represented and number of participants

48 people from 10 countries (Belgium, China, Denmark, France, Israel, Netherlands, Portugal, Sweden, United Kingdom, United States) attended the conference.

d) Publication of Proceedings of the Symposium

All abstracts were collected in the Conference Handbook and distributed to the participants. The formal proceedings of the symposium is prepared and planned to be published by Springer.

e) Financial support

120 thousand RMB from National Natural Science Foundation of China, 50 thousand RMB from the State Key Laboratory of Structural Analysis for Industrial Equipment, 80 thousand RMB from "111" project of State Bureau of Foreign Experts of the People's Republic of China, 20 thousand RMB from International Joint Research Center for Structural Optimization Theory and Application, and 30 thousand RMB from the registration fee for delegates.

f) Scientific program

October 8

8:15-8:30: Dongming Guo (Chancellor of DLUT), Niels Olhoff and Daining Fang opening remarks
8:30-9:00: *Data-driven Microstructure and Mechanical Property Design in Additive Manufacturing ,using Self-Organizing Map*, Wing Kam Liu, Northwestern University
9:00-9:30: *Additive Manufacturing for High-Performance, Large, Critical Metallic Components and its Impacts on Structural Design & Manufacturing of Advanced Industrial Equipments*, Huaming Wang, Beihang University
9:30-10:00: *Addictive Manufacturing: From 3D to 4D printing*, Weili Song, Beijing Institute of Technology
Photo 10:00-10:15
Morning Break/Poster Viewing 10:15-10:30
10:30-11:00: *Topology Optimization of Structures and Infill for Additive Manufacturing*, Ole Sigmund, Technical University of Denmark
11:00-11:30: *Additive manufacture oriented topology optimization based on approaches with explicit geometry description*, Xu Guo, Dalian University of Technology
Lunch 11:30-2:00
2:00-2:30: *A Virtual-Temperature-Method for Topology Optimization Design Considering Manufacturing Constraint*, Shutian Liu, Dalian University of Technology
2:30-3:00: *Additive Manufacturing Opportunities: Multiscale Topology Optimization and Related Topics*, David Rosen, Georgia Institute of Technology
3:00-3:30: *Design for Additive Manufacturing – Comprehensive Software Solutions*, Ming Zhou, Altair Engineering
Afternoon Break/Poster Viewing 3:30-4:00
4:00-4:30: *Topology Optimization of Structures for Additive Manufacturing with Considerations of Manufacturing constraints and Material Properties*, Weihong Zhang, Northwestern Polytechnical University
4:30-5:00: *Multiscale Topology Optimization of Shell-infill Structures Using a Distance Regularized Parametric Level-set Method*, Liang Gao, Huazhong University of Science and Technology

Posters available for viewing 5:00-6:00
Welcome Reception 6:00-7:30

October 9
8:30-9:00: *Design of Manufacturable Multiscale Structures using Robust Topology Optimization*, Wei Chen, Northwestern University
9:00-9:30: *Large-scale Topology Optimization Oriented towards Additive Manufacturing*, Oded Amir, Israel Institute of Technology
9:30-10:00: *Optimization of Pseudo-Ductile Behavior of Hybrid Composites Under Uniaxial Traction*, Helder C. Rodrigues, Laeta- Associated Laboratory for Energy, Transports and Aeronautics
Morning Break/Poster Viewing 10:00-10:30
10:30-11:00: *Sequential Approximate Integer Programming for Topology Optimization*, Gengdong Cheng, Dalian University of Technology
11:00-11:30: *Topology Optimization of Non-linear Structures*, Mathias Wallin, Lund University
Lunch 11:30-2:00
2:00-2:30: *Parallel Multi-scale Topology Optimization of Lattice Materials in Point View of Additive Manufacture*, Jun Yan, Dalian University of Technology
2:30-3:00: *Interactive Conceptual Design of AM Components using Layout & Geometry Optimization*, Linwei He, University of Sheffield
3:00-3:30: *Topology Optimization of Adaptively Refined Infill Structures for Additive Manufacturing*, Jun Wu, Delft University of Technology
Afternoon Break/Poster Viewing 3:30-4:00
4:00-4:30: *Analysis and Optimization Design for Fan Blade and Case of Aero Engine*, Xianghai Chai, AVIC Commercial Aircraft Engine Co., LTD
Posters available for viewing 4:30-6:00
Banquet 6:00-7:30

October 10
8:30-9:00: *A Numerical Efficient Approach of Aggregation Process for Additive Manufacturing Constraints in Topology Optimization*, Pierre Duysinx, University of Liege
9:00-9:30: *Thermal Constraints in Topology Optimization of Structures Built by Additive Manufacturing*, Lukas Jakabcin, Ecole Polytechnique
9:30-10:00: *Improvements to Projection-based Topology Optimization for Overhang Constraints*, James K. Guest, Johns Hopkins University
Morning Break/Poster Viewing 10:00-10:30
10:30-11:00: *A Reduced-order Model Approach for Topology Optimization of Natural Convection Problems with Additive Manufacturing Constraints*, Nicolo Pollini, Technical University of Denmark
11:00-11:30: *Design for Discovery: Generative Design of Conformal Structures*

using Level-Set-Based Topology Optimization and Conformal Geometry Theory, Shikui Chen, State University of New York at Stony Brook
11:30-12:00: *The Opportunities and Challenges Brought by Additive Manufacturing to Topology Optimization*, Jiyuan Ye, EOS Electro Optical Systems (Shanghai) Co., Ltd
Lunch 12:00-2:00
2:00-3:45 Panel Discussion. Chair: Wing Kam Liu. Panelists: Gengdong Cheng, Ole Sigmund, Wei Chen, Ming Zhou.
3:45-4:00 Closing remarks of technical session
Posters available for viewing 4:30-6:00
Dinner 6:00-7:30

October 11
Whole Day: Technical discussion

October 12
Morning: Seminars at Dalian University of Technology and lab visit
Afternoon: Wrap up.

Report composed by Jun Yan, Yonggang Zheng and Yichao Zhu

18-15 IUTAM Symposium on Dynamics of Complex Fluids and Interfaces
Kanpur, India, December 17 – December 20, 2018

Website: www.iitk.ac.in/iutam

Organizers: Ishan Sharma (Mechanical Engineering), V. Shankar (Chemical Engineering), Indian Institute of Technology Kanpur, India

a) Scientific Committee
Ronald Larson, University of Michigan, USA; James Jenkins, Cornell University, USA; Ravi Jagadeeshan, Monash University, Australia; Prabhu Nott, Indian Institute of Science, India; V. Kumaran, Indian Institute of Science, India; Grae Worster, Cambridge University, UK; John Hinch, Cambridge University, UK; Atila Freire, Federal University of Rio de Janeiro, Brazil (IUTAM Representative).

b) Short summary of scientific progress achieved
The goal of the Symposium was to discuss the present status and variety in research in the broad area of complex fluids and interfaces, and identify major new challenges. Complex fluids (e.g. polymers, grains, etc.) interest engineers, physicists, and mathematicians. At the same time, fluids interact with the environment, other complex fluids, or with soft and highly deformable solids across interfaces. Sometimes, the interface is a site for phase change, and is influenced by dissolved solutes. Such interfaces are complex in nature, and not all the physics has been unraveled, e.g. is interfacial tension uniquely defined at a soft solid-liquid interface? In addition, there has been significant development in the area of dynamics and rheology of `active matter', which are a unique class of complex fluids.

A fundamental challenge in complex fluids arises due to inter-particle interactions, which leads to a, generally intractable, `many-body' problem. Often, such interactions are mediated by a background fluid, or affected by a boundary. Then there are possibilities such as the transitioning of colloidal suspensions to granular suspensions, where lubricated inter-particle contacts are replaced by frictional contacts. These aspects make the description of complex fluids very challenging. Interfaces in simpler systems (e.g. gas-liquid) are well understood, but interface involving a complex fluid and another medium less so. The microstructural length scale in the complex fluid may become comparable to the scale characterizing interfacial thickness, and this may introduce discontinuities in fields across the nominal interface. Sometimes, the interface itself has to be treated as a separate continuum.

Both complex fluids and interfaces require understanding founded on first principles. This is a necessary prerequisite to formulate the macroscopic rheology of complex fluids, and to describe interfaces in a physically useful and mathematically consistent

manner. Such an understanding will aid in several industrial applications that involve the processing of complex fluids and grains.

The Symposium was divided into four broad themes:

I. ***Granular flows*:** We heard talks on the rheology, stability, and dynamics of granular flows, as well as presentations of modeling of flows involving granular media in geophysical contexts. Simulation efforts on cohesive granular materials, and experiments that "look inside" granular media to understand their fabric, were discussed. Some of the main challenges for the future include:
   i. understanding the effect of cohesion upon the behavior of granular materials;
   ii. development of experimental techniques that will allow us to probe the internal flow/structure of granular media;
   iii. improvement of constitutive laws in dense flows to account for many-grain interactions; and
   iv. the translation of lab-scale development to the modeling of geophysical flows marked by non-uniformity in grain properties, and complex environmental conditions and interactions.

II. ***Suspensions*:** Talks were given on both rheology of suspensions, such as colloids and particle-laden flows, incorporating the possible presence of electric fields. Work on active matter, which includes biological suspensions was also presented. Some of the main challenges that emerged are:
   i. a fundamental description of hydrodynamic interactions in multi-particle active matter; and
   ii. a rigorous formulation of hydrodynamics inside the cell, a crowded "suspension" of complex shaped objects.

III. ***Polymer rheology*:** Polymer rheology of both entangled and unentangled polymer solutions was explored using careful experiments and large-scale molecular dynamics simulations. Some outstanding issues that emerged are:
   i. nonlinear rheology of polymer melts;
   ii. dynamics of associating polymers;
   iii. rheology of polymer solutions in the semi-dilute regime; and
   iv. rheology of semi-dilute polymer solutions.

IV. ***Interfaces*:** Spectrum of research from particle, or acoustic induced interfacial instability in lab flows to interfaces in biological membranes to the stability of Mammatus clouds was presented. Some of the questions that emerged are
   i. effect of the presence of extraneous media (particles in fluids, or proteins in bio-membranes) on the stability/shape of interfaces;
   ii. effect of shape/stability of an interface on sorting and/or growth in biological systems; and
   iii. the effect on interfaces of external fields such as acoustic or electric.

Finally, cloud physics emerged as a promising, important, interdisciplinary and relatively unexplored frontier.

Besides the invited talks there were 20 contributed posters from senior Ph. D. students, post-doctoral fellows, and young academics. These posters built upon and/or added to the topics covered in the talks. The list of the posters and their titles is provided below.

General Objectives: The objective of the *IUTAM symposium on Dynamics of complex fluids and interfaces* was to bring together leading researchers to discuss recent developments and future challenges in

i. Complex fluids: Rheology and stability of flows of grains, polymers, suspensions and active matter.
ii. Interfaces (a) between fluids and soft solids, and (b) driven by phase change.

c) Countries represented and number of participants

More than 40 participants from across the world including USA, UK, Greece, Italy, France, India, Japan, Australia attended the symposium. The talks presented in the symposium were of 40 minutes duration with another five minutes for discussion. All the topics mentioned above in complex fluids and interfaces were covered by the speakers, and in-depth discussions followed each talk, which continued during coffee and lunch breaks, and even during dinner. The invited speakers were drawn to form a balanced mix of theorists and experimentalists, including several young researchers.

In particular, discussions were held on:

i. Rheology of dense granular flows and mixtures.
ii. Dynamics and rheology of unentangled, entangled and associative polymers.
iii. Dynamics of active matter and intracellular macromolecules.
iv. Interfacial instabilities with and without particles, the effect of external fields, and cloud formation.
v. Rheology and dynamics of dense suspensions.

d) Publication of Proceedings of the Symposium

We have made arrangements to publish a special issue on this Symposium in the Journal *Sadhana: Academy Proceedings in Engineering Sciences*, co-published by Indian Academy of Sciences and Springer. We are currently seeking contributions from the participants.

e) Financial support

USD 5000 from IUTAM, INR 3,00,000/- from Department of Science and Technology, Government of India, INR 6,00,000/- from Sterlite Industries, Aurangabad, India, INR 3,00,000/- from Saint Gobain, India.

f) Scientific program

Sunday, 16 December 2018

5:30 p.m. onwards: Registration desk opens at Outreach Auditorium foyer.
6:00 -7:30 p.m.: Cultural evening
8:00 p.m. onwards: Reception dinner at Outreach lawns

Monday, 17 December 2018

9-9:30 a.m. Welcome and Inauguration

Session-I Granular flows – 1 (Chair: Jim Jenkins)

9:30-10:15a.m. Devang Khakhar, *Rheology of granular mixtures in dense flows*
10:15-11a.m. Joe Goddard, *Dissipation potentials and the stability of granular flow*
11-11:45 a.m. Ashish Bhateja, *Rheology of steady, dense, cohesionless granular flows.*
11:45-12:15 p.m. Coffee Break
12:15-1:00 p.m. Pitch talks for posters (10 minutes each)
Anubhab Roy, Jason Picardo, Akash Sharma, Amarendar Nagilla
1:00-2:30 p.m. Lunch at Outreach lawns

Session-II Polymer Rheology – 1 (Chair: Nicholas Abbott)

2:30-3:15 p.m.. Dimitris Vlassopoulos, *Nonlinear shear rheometry of entangled polymers*
3:15-4:00 p.m. Ravi Jagadeeshan, *Universal scaling and the understanding of gelation in associative polymer solution*
4:00-4:45 p.m. Coffee Break + Posters
4:45-5:30 p.m. Prabhakar Ranganathan, *Concentration dependence of rheological properties of unentangled polymer solutions*
5:30-6:15 p.m. Ron Larson, *Simulations of Polymers and Surfactants at Interfaces*
7:30 - 9:30 p.m. Dinner at Outreach lawns

Tuesday, 18 December 2018

Session-III Suspensions – 1 (Chair: John Brady)

9:00-9:45a.m. Philippe Coussot, *Wall Slip Mechanism in Yield Stress Fluids*
9:45 -10:30a.m. Ganesh Subramanian, *Interacting swimmer suspensions: velocity fluctuations, tracer diffusivity and rheology*
10:30-11:15a.m. Norm Wagner, *Rigidity percolation, gelation, and glass transitions of spherical & anisotropic colloidal suspensions with thermoreversible short-range attractions*
11:15-11:45 a.m. Coffee Break
11:45-12:30 p.m. Roseanna Zia, *The hydrodynamics of intracellular macromolecular motion*
12:30-1:15 p.m Ryohei Seto, *Shear jamming and rheology of dense suspensions*
1:15-2:30 p.m. Lunch at Outreach lawns

Session-IV Interfaces – 1 (Chair: Herbert Huppert)

2:30-3:15 p.m. Sungyon Lee, *Particle induced interfacial instability*
3:15-4:00 p.m. Rama Govindarajan, *Mammatus Clouds*
4:00-4:30 p.m. Coffee Break + Posters
4:30-5:15 p.m. Ranga Narayanan, *Interfacial Instabilities from Resonance-Physical Phenomena, Mathematical Modeling, Experimental Evaluation*
5:15-6:00 p.m. Sovan Lal Das, *Sorting of proteins with shape and curvature anisotropy on a lipid bilayer tube*
6:30-8:00 p.m. Cultural evening
Hindustani instrumental music performance by Dr. Kamala Shankar (Indian classical guitar, innovated from the Hawaiian guitar) and Pandit Vinod Lele (Tabla).
8:00 - 9:30 p.m. Dinner at Outreach lawns

Wednesday, 19 December 2018

Session-V Suspensions – 2 (Chair: Prabhu Nott)

8:45-9:30 a.m. Lynden Archer (via video conferencing), *Electrokinetics in viscoelastic liquid electrolytes above the diffusion limit*
9:30-10:15a.m. John Brady, *The Mechanics of Active Matter*
10:15 -11:00a.m. Anugrah Singh, *Particle migration in rotating suspensions*
11:00-11:15 a.m. Coffee Break
11:15-12:00 p.m. Mahesh Tirumkudulu, *Capillary Induced Motion of Particles Bridging Interfaces of a Thin Liquid Film*
12:00-12:45 p.m. Jim Jenkins (for Luigi LaRagioni), *Microstructure and Particle-Phase Stress in a Dense Suspension*
12:45-1:30 p.m Rochish Thaokar, *Capsules and vesicles in electric fields*
1:30-2:45 p.m. Lunch at Outreach lawns

Session-VI Granular flows – 2 (Chair: Devang Khakhar)

2:45-3:30 p.m. Jean-Noel Roux, *Rheology of cohesive granular materials : DEM results*
3:30-4:15 p.m. Prabhu Nott, *A higher-gradient "non-local" model for dense granular flows that captures shear-driven dilatancy*
4:15-5:00 p.m. Coffee Break + Posters
5:00-5:45 p.m. Nathalie Vriend, *Probing granular physics across scales using tailored experiments*
5:45-6:30 p.m. Tejas Murthy, *Quantifying fabric in granular materials using computed tomography*
7:30 - 9:30 p.m. Banquet at Outreach lawns

Thursday, 20 December 2018

Session-VII Interfaces – 2/Polymer Rheology – 2/Granular flow – 3 (Chair: Ron Larson)

9:00-9:45a.m.	Nicholas Abbott, *Optically-Induced Changes in Nanoparticle Solvation and Mobility*
9:45 -10:30a.m.	Mohd. Suhail Rizvi, *Regulation of epithelial tissue rheology in embryonic development*
10:30-11:15a.m.	Laxmi Narasimha Rao, *Shear Induced Migration in Bacterial Suspensions*
11:15-12:00 p.m.	High Tea
12:00-12:45 p.m.	Jim Jenkins, *Fluidity, Anisotropy, and Velocity Correlations in Collisional Shearing Flows*
12:45-1:30 p.m	Michele Larcher, *Segregation in dense, inclined, layered granular flows*
1:30-2:15 p.m.	Herbert Huppert, *Flow of buoyant granular material along a free surface*
2:15p.m.	Lunch at Outreach lawns

***Poster Titles*:**

1. Jason Ryan Picardo, *Preferential Sampling of Elastic Chains in Turbulent Flows.*
2. Anubhab Roy, *A finite-Re slender body theory.*
3. Prachi Thareja, *Implications of Colloidal Self Assembly, Confinement and Electric Field on Rheology, Microstructure of Colloidal Particles-in-Liquid Crystal Suspensions.*
4. Piyush Garg, *The nonequilibrium statistical mechanics of run-and-tumble particles.*
5. Bhawna Tomar, *Cracking in drying films of polymer solutions.*
6. Kiran Kumari, *Computing three-dimensional chromatin configurations from two-dimensional contact probability maps: An inverse Brownian dynamics algorithm.*
7. Ramalingham Kailasham, *Wet and dry friction in a dumbbell model of a polymer.*
8. Aakash Sharma, *Modelling the viscoelastic response of polymeric fibres.*
9. Anamika Maurya, *Control of Hydrodynamic Characteristics of Yield-Stress Fluids by Rotating Cylinder in a Rectangular T-channel.*
10. Shraddha Mandloi, *Stability analysis of the flow of Newtonian fluid in a deformable channel with unrestrained boundary.*
11. Nitish Singh, *Reusable paper.*
12. Mohammad Khalid, *Early transition in the channel flow of viscoelastic Oldroyd-B fluid.*

13. Ramkarn Patne, *Hydrodynamic and constitutive instabilities in the flow of a shear-thinning viscoelastic fluid.*
14. Mohit Trivedi, *Wall effects on flow and mass transfer from a Newtonian fluid sphere falling in a tube of Bingham plastic fluid.*
15. Bidhan Chandra, *Experimental observations of instabilities in the flow of shear-thinning fluids through tubes.*
16. Alok Kumar, *Air entrainment dynamics during impact and freezing of a high speed metal droplet onto a solid substrate.*
17. Indresh Chaudhary, *Elasto-inertial instability in pipe Poiseuille flow of an Oldroyd-B fluid.*
18. Akash Agarwal, *Particle-scale modelling of selective laser melting process using a coupled DEM-CFD approach.*
19. Prasad Sonar, *Granular flows over rigid, inclined bases that are either spring-supported or externally vibrated.*
20. Shruti Pandey, *High strain rate behaviour of ice silicate mixture.*

Report prepared by Ishan Sharma and V. Shankar

Summary Record of the General Assembly Meeting 2018

Summary Record of the General Assembly of IUTAM in Boston, USA, on 23 and 24 July 2018

The General Assembly of IUTAM convened at Raytheon Amphitheater, Egan Building, Northeastern University. The schedule of sessions was as follows:

Monday, 23 July 2018
14:00 –17:30 General Assembly: 1st session

Tuesday, 24 July 2018
14:00 – 17:30 General Assembly: 2nd session

Attendance:

Members with voting rights:
N. Aubry (USA), Y. Bai (China, Member-at-Large), D. Bigoni (Italy), C.-C. Chang (China-Taipei), A. Cocks (UK), S. Dost (Canada), J. Dual (Switzerland), P. Eberhard (Germany), N.A. Fleck (UK), J.M. Floryan (Canada), S. Forest (France), L. Franzoni (USA), A.P.S. Freire (Brazil), H. Gao (USA), M.D. Gilchrist (Ireland), J. Grue (Norway), P. Guillaume (Belgium), S. Hartmann (Germany), K. Hishida (Japan), P. Huerre (France), K. Kishimoto (Japan), A. Kluwick (Austria), D. Kondo (France), R. Kouhia (Finland), D. Lohse (Netherlands), J.B.R. Loureiro (Brazil), S. Lundstrom (Sweden), G. McKinley (USA), R.M. McMeeking (USA), M.A.F. de Medeiros (Brazil), S. Mittal (India), H. Nguyen-Xuan (Viet Nam), N. Nishimura (Japan), P. Onck (Netherlands), J. Paavola (Finland), T.J. Pedley (UK, Member-at-Large), H. Petryk (Poland), S. Popinet (France), S. Radev (Bulgaria), M.B. Rubin (Israel), J. Salençon (France, Member-at-Large), A. Salupere (Estonia), O. Sano (Japan), W. Schiehlen (Germany, Member-at-Large), B.A. Schrefler (Italy), S. Shrivastava (Canada), S. Skatulla (South Africa), G. Stépán (Hungary), G. Turkalj (Croatia), V. Tvergaard (Denmark), W.-C. Wang (China-Taipei), L. van Wijngaarden (Netherlands, Member-at-Large), X.J. Zheng (China)

Non-voting observers:
P. Ariza (Spain), L. Banks-Sills (Israel; representative of ICF), D. Reddy (South Africa; representative of ICSU/ISC)

Members with voting rights represented by proxies:
J.D. Achenbach (USA, Member-at-Large), represented by H. Gao
A. Bottaro (Italy), represented by D. Bigoni
F.L. Chernousko (Russia), represented by W. Schiehlen

W. Crone (USA), represented by G. McKinley
G. deBotton (Israel), represented by M.B. Rubin
I.G. Goryacheva (Russia), represented by T.J. Pedley
G.J.F. van Heijst (Netherlands), represented by L. van Wijngaarden
H.Y. Hu (China), represented by X.J. Zheng
A. Juel (UK), represented by N.A. Fleck
R. Kerswell (UK), represented by N.A. Fleck
S. Kyriakides (USA), represented by G. McKinley
V.A. Levin (Russia), represented by H. Petryk
M. Lightstone (Canada), represented by S. Shrivastava
W.K. Liu (USA), represented by L. Franzoni
T.J. Lu (China), represented by X.J. Zheng
F. Lund (Chile), represented by V. Tvergaard
G. Maier (Italy, Member-at-Large), represented by D. Bigoni
H.K. Moffatt (UK, Member-at-Large), represented by N.A. Fleck
P.A. Monkewitz (Switzerland), represented by J. Dual
C. Niordson (Denmark), represented by V. Tvergaard
N. Olhoff (Denmark), represented by V. Tvergaard
G. Rega (Italy), represented by D. Bigoni
J. Schumacher (Germany), represented by P. Eberhard
R. Seifried (Germany), represented by P. Eberhard
P. Stahle (Sweden), represented by S. Lundström
J.N. Sørensen (Denmark), represented by V. Tvergaard
T. Tatsumi (Japan, Member-at-Large), represented by O. Sano
D.V.H. Vandepitte (Belgium), represented by P. Guillaume
W. Yang (China), represented by X.J. Zheng

Agenda Monday, 23 July 2018, 14:00 – 17:30

1. Opening of the meeting by the President
   Minutes of the General Assembly in Montreal, Canada, on 23-24/08/2016 (IUTAM Report 2016, pp. 82-101)
2. Report by the Secretary-General
3. Report by the Treasurer on financial matters
4. Preliminary discussion on annual dues
5. Report by the Secretary of the Congress Committee
6. Presentation of ICSU/ISC by Professor Daya Reddy, President of the International Science Council (ISC)
7. Matters concerning Adhering Organizations
8. Matters concerning Associate Organizations
9. Matters concerning Affiliated Organizations
10. Proposal for the Electoral Committee

11. Proposals for election of members of the Congress Committee
12. Proposals for election of members of Symposia Panels
13. Preliminary discussion on future IUTAM Symposia and Summer Schools. Reports from Solids and Fluids Panels
14. Preliminary discussion on a change of Statutes concerning voting by electronic means
15. The Batchelor Prize in Fluid Mechanics and the Rodney Hill Prize in Solid Mechanics

Agenda Tuesday, 24 July 2018, 14:00 – 17:30

16. Election of members of the Congress Committee
17. Future IUTAM endorsed events
18. Matters concerning Inter-Union Committees
19. Continued discussion and final decision regarding future IUTAM Symposia
20. Continued discussion and final decision regarding future IUTAM Summer Schools on Mechanics
21. Continued discussion and final decision regarding annual dues
22. Election of members of the Electoral Committee
23. Election of members of Symposia Panels
24. Final decision regarding the change of Statutes concerning voting by electronic means
25. Date and venue of the next General Assembly meeting
26. Any other business

Proceedings of the General Assembly

Item 1 – Opening of the meeting by the President

The President, Professor Nadine Aubry, welcomed all members and observers. Then the President formally opened the meeting. The Agenda was unanimously approved. The minutes of the General Assembly held in Montreal, Canada, in 2016, were unanimously adopted.

The President reported with great sadness on the death of two very distinguished colleagues:

Professor Michael A. Hayes, former Secretary General (1996-2000) of IUTAM, passed away on 1 January 2017.

Professor Bruno A. Boley, life Member-at-Large of IUTAM, former Treasurer (1992-1996) and Secretary of the Congress Committee (1976-1984), passed away on 11 February 2017.

The President paid tribute to them and presented a brief summary of their outstanding achievements.

The memory of Professors Michael Hayes and Bruno Boley was honored by the General Assembly with a moment of silence.

Item 2 – Report by the Secretary-General

The Secretary-General, Professor Henryk Petryk, submitted the following report to the General Assembly on the activities of IUTAM since the last General Assembly in Montreal, Canada, on 23 and 24 August 2016:

Mrs. President, Mr. President of the International Science Council, Dear Colleagues,

It is a great honor for me to deliver my report in front of such a distinguished audience. It will be an oral report; details will be presented later on the slides.

Two years have passed since our last General Assembly in Montreal, Canada. As Mrs. President reported, during that time we had the sad duty of recording the deaths of two of our distinguished colleagues and friends who have served our Union. Summaries of their scientific contributions have been posted on the IUTAM website.

IUTAM Reports

IUTAM Reports 2016 and 2017 have been edited and published both in paper form and on the website.

Adhering Organizations

There are now 46 adhering organizations since the Spanish Adhering Organization in IUTAM, the Spanish Group of Fracture (AEIE-GEF), decided to discontinue their membership of IUTAM in February this year. However, shortly thereafter, on 30 April 2018, IUTAM received an official letter from a new Spanish Organization with the application to become an Adhering Organization, and this will be further addressed under item 7 on the Agenda. IUTAM is pursuing contacts with several countries, which might result in the establishment of new Adhering Organizations in the future.

Associate Organizations

There are currently two Associate Organizations: from Armenia and Cyprus. Following a decision taken by the previous General Assembly in Montreal, the national organization from Armenia became an Associate Organization of IUTAM in 2016. In turn, the usual 8-year Adhering Associate term for Cyprus ends in 2018, and this will be further addressed under item 8 on the Agenda.

Affiliated Organizations
There are 21 Affiliated Organizations. The reports presented by the Affiliated Organizations in the past two years are included in the IUTAM Reports 2016 and 2017. No new affiliation proposal has been submitted for consideration to the Bureau during the last two years. Changes of the representatives in Affiliated Organizations will be presented later under item 9.

Matters concerning ICSU
In the previous reports by the Secretary-General this item used to be presented. However, this year I omit this point in view of the merger to be reported by the President of the International Science Council under item 6.

Inter-Union Committees
The Bureau has nominated Professor Guruswami Ravichandran as the new IUTAM representative to the Committee on Space Research (COSPAR). Yesterday, the Bureau appointed a candidate whose role would be to strengthen the engagement of IUTAM with the Inter-Union Committee on Data for Science and Technology (CODATA).

IUTAM Symposia
In 2016, ten IUTAM Symposia have been successfully organized with an average attendance of 68. In 2017, six IUTAM Symposia have been successfully organized with an average attendance of 48. Reports on these may be found in Annual Reports 2016 and 2017, respectively. Fifteen IUTAM Symposia have been scheduled for 2018. Nine of them have already been successfully organized. All remaining Symposia will be organized in the period from August to December 2018. Seven IUTAM Symposia are scheduled for 2019.

IUTAM Summer Schools
In 2016 there was one IUTAM Summer School at CISM, Udine, with 26 participants. In 2017 there was one IUTAM Summer School at CISM, Udine, with 44 participants. No IUTAM Summer School has been scheduled for 2018, while one IUTAM-BICTAM Summer Schools is scheduled for 2019.

Endorsement (previously Co-Sponsorship)
Four events scheduled for 2018 have been endorsed by IUTAM, and this will be further addressed under item 17 on the Agenda.

IUTAM website
The IUTAM website is running smoothly and it is of great help to the IUTAM Secretariat. The website has recently been substantially modified, modernized and upgraded to comply with the current website design standards, to increase security

and improve access from mobile devices. The upgrade will also simplify possible further enhancements of the website.

IUTAM Newsletter
The IUTAM Newsletter is appearing twice a year, and contains information on the current and future events.

Publications
From January 2011 up to December 2017, the preferred publication route for IUTAM Symposia Proceedings was Procedia IUTAM, and 26 volumes have been published. Since the contract for Procedia IUTAM was due to expire on 31 December 2017, and Elsevier expressed the wish to not extend the contract, in November 2017 a new contract with Springer was signed by the Secretary-General for resuming the IUTAM Bookseries, in which 32 volumes had been published in the past. The basic conditions were negotiated beforehand by Peter Eberhard and they are very convenient for IUTAM. Publication of Symposium proceedings in the Series, recommended by IUTAM since 2018, is voluntary and free of charge, with temporary free access to the online version of the proceedings granted to all participants of the Symposium. Symposia organizers, if they wish, may also buy printed or electronic copies of their volumes or purchase the open access option. Five volumes have already been contracted. According to the resolution adopted by the General Assembly in Montreal, other acceptable forms for proceedings are special issues of high-quality journals or other forms previously approved by the Bureau of IUTAM.

Mrs. President, this concludes my report.

Henryk Petryk, Secretary-General

The report by the Secretary-General was adopted.

Item 3 – Report by the Treasurer on financial matters
The Treasurer, Professor Peter Eberhard, submitted a report to the General Assembly.

The financial audit procedure for the year 2017 was performed without problems and the auditing company UNITreu GmbH in Eschborn / Germany verified all the numbers and transactions on IUTAM's accounts. As of December 31, 2017 IUTAM had

598.349 USD on its accounts,

120.873 USD which were collected in 2017,

73.856 USD which were spent in 2017.

Compared to the balance of December 31, 2016, which was 534.737 USD, this gives an increase of 63.612 USD for the year 2017 (including a gain of 16.596 USD from changes in the exchange rates).

The money is distributed between three checking accounts (in USD, EURO, DKK) at Spar Nord Bank, a savings account at Spar Nord Bank and a savings account at Nordea Bank. Unfortunately, the current interest rates are extremely low.

The audit report with detailed numbers is available from the Treasurer.

The Treasurer emphasizes that IUTAM has a structural deficit, meaning that averaged over the years IUTAM spends more money compared to what it collects. However, the Bureau proposed to keep the membership dues constant at 810 USD per unit annually. In the future we will have to increase the dues again according to the rules decided by the GA in the past so that they follow the UNESCO inflation numbers.

Many thanks go to our Assistant Treasurer Niels Olhoff for his ongoing help dealing with Danish authorities.

Peter Eberhard, Treasurer

The report by the Treasurer was adopted.

Item 4 – Preliminary discussion on annual dues

Following his report the Treasurer led a brief discussion on the annual dues as follows:

Our dues in USD have developed as follows (see previous reports):

Year	2014	2015	2016	2017	2018	2019
Unit dues	810	810	810	810	810	810
Increase		0%	0%	0%	0%	0%

The Treasurer proposed not to increase the dues in USD for 2020 and 2021.

It was noted that the final decision regarding annual dues would be made in the second session of the General Assembly, see item 21 below.

Item 5 – Report by the Secretary of the Congress Committee

The Secretary of the Congress Committee, Professor Robert McMeeking, presented the following report:

President Aubry, Members of the Bureau, Ladies and Gentleman of the General Assembly, after the last meeting of the General Assembly at ICTAM2016 in Montréal the Congress Committee (CC) met in the same location and selected Milan as the venue for ICTAM2020. It will be held in the Milan Congress Centre 23rd to 28th August 2020 under the leadership of ICTAM2020 President Alberto Corigliano and ICTAM2020 Secretary-General Umberto Perego, both of the Politecnico di Milano. The Executive Committee of the Congress Committee (XCCC) met thereafter in Montréal for wrap up discussions of ICTAM2016 and to make preliminary plans for the organization of ICTAM2020. ICTAM2016 President Maciej Floryan, ICTAM2020 President Alberto Corigliano and ICTAM2020 Secretary-General Umberto Perego were all present to enable the best possible transition and continuity from ICTAM2016 to ICTAM2020.

The XCCC next met in Milan on 10th & 11th June 2017. These meetings were held in the NH Grand Hotel Verdi, and a tour of the venue for ICTAM2020 was provided to the Executive Committee on 12th June. At these meetings the XCCC identified a priority ranked list of names for the International Papers Committee (IPC) for ICTAM2020. I am pleased to report that the 6 top choices for the IPC (3 in solids and 3 in fluids) all accepted the invitation to participate. As I am sure you know, the IPC selects the papers to be presented at ICTAM, and thus plays a crucial role in ensuring the high quality of papers presented at the Congress.

The XCCC also identified the 6 Mini-Symposia to be held at ICTAM2020. They will be (1) Modeling and controling turbulent shear flows, (2) Local mechanics of climate processes, (3) Biological fluid-structure interaction at the microscale, (4) Nonlinear dynamics for design, (5) Mechanics of additive manufacturing, and (6) Mechanics of C-allotropic materials and structures. Possible Co-Chairs for these Mini-Symposia were identified, and I have secured agreement from the selected individuals. They are as follows:

Modeling and Controlling Turbulent Shear Flows

Co-Chairs Professor Ivan Marusic
Department of Mechanical Engineering
University of Melbourne
Australia

Professor Beverley McKeon
GALCIT

California Institute of Technology
Pasadena CA
USA

Local Mechanics of Climate Processes
Co-Chairs Professor Eberhard Bodenschatz
Max Planck Institute for Dynamics and Self Organization
Goettingen
Germany

Professor John Wettlaufer
Department of Physics
Yale University
New Haven CT
USA

Biological Fluid-Structure Interaction at the Microscale
Co-Chairs Professor Prosenjit Bagchi
Department of Mechanical and Aerospace Engineering
Rutgers University
New Brunswick NJ
USA

Professor Anne-Virginie Salsac
Bioengineering Department
CNRS – Université de Technologie de Compiègne
France

Nonlinear Dynamics for Design
Co-Chairs Professor Remco Leine
Institute for Nonlinear Mechanics
University of Stuttgart
Germany

Professor Stefano Lenci
Polytechnic University of Marche
Ancona
Italy

Mechanics of Additive Manufacturing
Co-Chairs Professor Ferdinando Auricchio
Dipartimento di Meccanica Strutturale

Università degli Studi di Pavia
Italy

Professor Matthew Begley
Department of Mechanical Engineering
University of California
Santa Barbara CA
USA

Mechanics of C-Allotropic Materials and Structures
Co-Chairs Professor Julia Greer
Division of Engineering and Applied Science
California Institute of Technology
Pasadena CA
USA

Professor Roberto Paroni
University of Pisa
Italy

It was confirmed that at ICTAM2016 Mini-Symposia will consist of 4 invited lectures that the organizer of the Mini-Symposium can invite without reference to the IPC and without the possibility of being overruled by the IPC. Thereafter the Mini-Symposium will continue with 20-minute lectures. There will also be Short Talk with Poster sessions associated with Mini-Symposia.

Full-length presentations in Thematic Sessions will consist only of 20-minute lectures. However, it was confirmed that the organizers of a Thematic Session will be permitted to issue 4 invitations for lectures without reference to the IPC and without the possibility of being overruled by the IPC. The Thematic Sessions will also have Short Talk with Poster presentations.

The XCCC confirmed that the proceedings of ICTAM2020 will be produced in the form of a pdf archived on the IUTAM website and retained as a permanent item there, accessible online. It will consist of 4 page documents provided by the Opening, Closing and Sectional Lecturers and 2 page documents submitted by others who present talks at ICTAM2020. It will be the responsibility of the organizers to produce such pdfs and to provide them in a timely manner to IUTAM.

Additionally, it was confirmed by the XCCC that submissions to ICTAM2020 will consist only of a single document in the form of a 2 page description of the material

to be presented. This 2- page document should commence with an abstract of length 3 to 5 lines. The Opening, Closing and Sectional Lecturers will be required to submit a 4 page description that commences with a short abstract.

At the 2017 meeting in Milan the XCCC identified a Nominations Subcommittee whose responsibility is to assemble candidates for election to the CC, and to recommend procedures for carrying out those elections. The elections are, of course, carried out by the General Assembly. The recommendations of this subcommittee will be presented to the General Assembly tomorrow, 24th July 2018, at which time the elections will be undertaken.

The XCCC also met yesterday, 22nd July 2018, here at Northeastern University. At this meeting, the organizers of ICTAM2020 nominated Professor Nicola Pugno of the University of Trento to give the Opening Lecture. Consistent with established precedent that the Opening or the Closing Lecture is given by a person associated with the host nation, the XCCC accepted this nomination. It was also decided at this meeting that there will be 16 Sectional Lectures at ICTAM2020. These will be in addition to the Prize presentations, namely the Batchelor and Hill Lectures.

The CC met this morning. It endorsed the selection of Nicola Pugno to give the Opening Lecture at ICTAM2020 and then held a vote to select the person to give the Closing Lecture. As Professor Pugno will give his lecture in the area of solids, the ballot for Closing Lecture was restricted to candidates in the fluids area. The result of the vote is that Professor Elisabeth Guazzelli of the University of Aix-Marseille will be invited to give the Closing Lecture at ICTAM2020.

The CC also commenced its effort to select the 16 Sectional Lecturers for ICTAM2020. However, this process was not completed today and will continue at the CC meeting tomorrow, 24th July 2018.

This morning the CC also heard a summary of the report of the Nominations Subcommittee. Salient points of that report are that 6 individuals retire from the CC effective 31st October 2018 having completed 2 terms of office. These persons are Renato Cotta, Peter Eberhard, GertJan van Heijst, Ravi Ravi-Chandar, Howard Stone and Kazuo Tanishita. I wish to thank them for their service to the Committee. The report also notes that 5 persons complete their 1st term of office on 31st October 2018 and are therefore eligible for re-election for a 2nd term. The Nominations Subcommittee is recommending that these 5 persons should be re-elected to serve a 2nd term on the CC. If the General Assembly chooses to do so, there will then be 6 vacancies on the CC, to be filled by election from the 26 candidates who have been nominated for possible appointment to the Committee.

The Nominations Subcommittee is recommending that the candidates from France, Italy and the USA should be set aside from the election for new members of the CC as it already has adequate representation from those countries. The Subcommittee is also recommending the election of 4 new members in fluids and 2 new ones in solids as that will ensure a reasonable, though not precise, balance between those areas. Thus, the task of the General Assembly tomorrow, if it accepts the recommendations of the Nominations Subcommittee, will be to elect 4 new fluids members to the CC from the remaining 7 nominees in that area, and 2 new solids members from 12 remaining candidates.

Finally, I wish to report on the preliminary expressions of interest that we have received concerning ICTAM2024. So far, five groups have informed us of their interest in organizing this Congress. The relevant locations are Brazil, to be held in Rio de Janeiro, Germany, to be held in Aachen, India, to be held in Hyderabad, Japan, to be held in Tokyo, and Vietnam, host city unspecified. It is expected that these four expressions of interest will lead to firm proposals to hold the congress. These proposals may be augmented by additional bids that could materialize between now and 2020 when final proposals will be due.

This completes my report. I wish to thank you for your attention.

Robert M. McMeeking, Secretary of the Congress Committee

The report by the Secretary of the Congress Committee was adopted.
The President thanked the Secretary for his report.

Item 6 – Presentation of ICSU/ISC by Professor Daya Reddy, President of the International Science Council (ISC)

The President, Professor N. Aubry, welcomed Professor Daya Reddy, the President of the International Science Council (ISC), elected at the meeting of the Founding General Assembly of ISC held in Paris on 3-5 July 2018. ISC is the new organization created as the result of a merger between the International Council for Science (ICSU) and the International Social Science Council (ISSC). Professor Reddy gave a presentation of the structure, objectives and strategic plan of ISC.

Item 7 – Matters concerning Adhering Organizations

Czech Republic

The Secretary-General reported that the adhering organization of IUTAM from the Czech Republic, the Czech National Committee of Theoretical and Applied

Mechanics, merged with the Czech Society for Mechanics and ended its independent existence as of 31 December 2017. The Czech Academy of Sciences nominated the Czech Society for Mechanics to take over the function of the Czech Adhering Organization of IUTAM. The IUTAM Bureau approved the above change of organization name in an email vote and informed the Czech contact person of this decision on 30 November 2017.

Spain
The Spanish Adhering Organization, Asociación Española de Integridad Estructural, Grupo Español de Fractura (AEIE-GEF), terminated the membership of IUTAM in February 2018. The President of the newly-founded Sociedad Española de Mecánica Teórica y Aplicada (SEMTA) has requested the admission of SEMTA as the new Spanish Adhering Organization of IUTAM.

The General Assembly agreed to accept SEMTA as the new Adhering Organization from Spain.

Item 8 – Matters concerning Associate Organizations

Cyprus
The Cyprus Mathematical Society has been the Adhering Associate Organization of IUTAM representing Cyprus since 2010. According to Article XVI of the IUTAM Statutes, Associate Membership is normally limited to a maximum of eight years, which for Cyprus ends in 2018. The President of the Cyprus Mathematical Society has applied for an additional 4-year period of Adhering Associate membership. The IUTAM Bureau proposed to encourage Cyprus to apply for the Adhering Organization status, and did not support the extension of Associate membership.

After a discussion, it was agreed to postpone the final decision to the second session.

Item 9 – Matters concerning Affiliated Organizations
The Secretary-General reported that several new representatives of IUTAM in Affiliated Organizations had been appointed by the Bureau since the last General Assembly, and expressed gratitude to the previous representatives for their work.

Item 10 – Proposal for the Electoral Committee
The President presented a slate of names for the Electoral Committee which had the approval of the Bureau. Election is reported under item 22.

Item 11 – Proposals for election of members of the Congress Committee

The Nominations Subcommittee (NSCC), consisting of Professors Patrick Huerre (Chair), Robert McMeeking (*Ex Officio*, Secretary), Peter Eberhard, Maciej Floryan, GertJan van Heijst, Ann Karagozian, Djimedo Kondo, Tianjian Lu, Valery Matveenko and Jens Walther, provided recommendations regarding the elections to the Congress Committee (CC) for the period 2018 through 2022 to be carried out by the General Assembly. On behalf of NSCC Chairperson Huerre, NSCC Secretary McMeeking gave a report on the recommendations of the NSCC.

The NSCC noted that Professors Renato Cotta, Peter Eberhard, GertJan van Heijst, Krishnaswamy Ravi-Chandar, Howard Stone and Kazuo Tanishita retire from the CC on 31st October 2018 having served two 4-year terms. Secretary McMeeking proposed a vote of thanks for these retiring members, and the General Assembly thanked them for their service to the Congress Committee, with appreciation for their hard work, dedication and wisdom.

The current size of the CC was 34 members and the NSCC recommended, with the endorsement of the CC, that this size be maintained.

The report and recommendations of the NSCC were discussed by the General Assembly and Secretary McMeeking answered questions on them. The NSCC report and recommendations were accepted unanimously without modification.

The actual elections were held during the second session of the General Assembly under Item 16.

Item 12 – Proposals for election of members of Symposia Panels

Fluid Mechanics Panel

The Secretary-General reported that Professor Haecheon Choi (Republic of Korea) has served for two consecutive terms and should be replaced, and Professor Rama Govindajaran (India) has served her first term. The Bureau proposed to the General Assembly to reappoint Professor Rama Govindajaran (India) for the second term and appoint Professor Ann Karagozian (USA) as a new member of the Fluid Mechanics Panel.

Solid Mechanics Panel

The Secretary-General reported that Professor Wim Desmet (Belgium) had decided to step down from the panel and should be replaced, and Professor Tianjian Lu (China) has served his first term. The Bureau proposed to the General Assembly to reappoint

Professor Tianjian Lu (China) for the second term and appoint Professor Leslie Banks-Sills (Israel) as a new member of the Solid Mechanics Panel.

It was noted that the final decision regarding these proposals would be made in the second session of the General Assembly, see Item 23 below.

Item 13 – Preliminary discussion on future IUTAM Symposia and Summer Schools. Reports from Solids and Fluids Panels

The call for proposals for IUTAM Symposia in 2020/2021 has resulted in 19 proposals, listed below (FL stands for Fluids, FS for Fluid/Solids and SO for Solids).

FL.01 *Particles, drops and bubbles in stratified environments* (Toulouse, France)
FL.02 *Turbulent structure and particles-turbulence interaction* (Lanzhou, China)
FL.03 *Interface mechanics of complex flows and soft matter* (Beijing, China)
FL.04 *Modelling oceanic internal waves and their impact on offshore structures* (Beijing, China)
FL.05 *Dynamics and interface phenomena of bubbles and droplets at multiple scales* (Tokyo, Japan)
FL.06 *Fluid mechanics in the spirit of G. K. Batchelor* (Cambridge, UK)
FS.01 *Fluid-structure interaction – in honour of Michael Paidoussis* (Montreal, Canada)
FS.02 *Computational methods for large-scale and complex wave problems* (Tokyo, Japan)
FS.03 *Data-driven mechanics* (Paris, France)
FS.04 *Ultralarge-scale topology optimization* (Kongens Lyngby, Denmark)
FS.05 *Experimental approaches to nonlinear dynamics in mechanical systems* (Tsukuba, Japan)
SO.01 *Generalized continua emerging from microstructures* (Paris, France)
SO.02 *Nanoscale heat transfer* (St. Petersburg, Russia)
SO.03 *Computational fracture mechanics in multi- field problems* (Siegen, Germany)
SO.04 *Optimal guidance and control for autonomous systems* (Honolulu, USA)
SO.05 *Extreme loading on structures* (Roorkee, India)
SO.06 *The multiphysics analysis of wave propagation in electronic device structures* (Ningbo, China)
SO.07 *Mechanics of smart and tough gels* (Austin, USA)
SO.08 *Mechanics of liquid crystal elastomers* (Houston, USA)

The call for proposals has resulted in 3 proposals for IUTAM Summer Schools:

SSFS.01 *Controlling delayed dynamics: advances in theory, methods and applications* (Udine, Italy)
SSFS.02 *Plant biomechanics* (Udine, Italy)
SSSO.01 *Instability and bifurcation of solids including coupled field phenomena* (Udine, Italy)

The proposals for IUTAM Symposia and Summer Schools have been reviewed by the two Symposia Panels. All proposals, the evaluation tables and the full reports of the Panels have been distributed to the members of the General Assembly in advance of the meeting. The recommendations of the two Panels were reported by Professor Detlef Lohse, the Chairman of the Fluids Symposia Panel, and Professor Huajian Gao, the Chairman of the Solids Symposia Panel.

The Bureau proposed that no more than sixteen proposals should receive funding from IUTAM.

After a preliminary discussion the proposals for IUTAM Symposia were divided into two groups. The first group consisted of the ten proposals of rating R and coded FL.01, FL.03, FL.05, FL.06, FS.01, FS.02, FS.04, SO.01, SO.03, SO.07. The second group consisted of the remaining nine proposals, coded FL.02, FL.04, FS.03, FS.05, SO.02, SO.04, SO.05, SO.06, SO.08.

The proposals for Summer Schools coded SSFS.02 and SSSO.01 were given rating R by the Symposia Panels.

It was agreed that the IUTAM Symposia and Summer Schools of rating R would be accepted in the second session, whereas the remaining ones would be subjected to a full discussion.

Item 14 – Preliminary discussion on a change of Statutes concerning voting by electronic means

The Secretary-General reported that IUTAM's Statutes permitted voting by correspondence on matters that arise between the General Assembly meetings. However, it was not fully clear if voting by email was permitted. It would be advantageous to explicitly permit voting by electronic means in the Statutes. By analogy, a notification via electronic mail would be sufficient to constitute a proxy. The IUTAM Bureau proposed an amendment to IUTAM's Statutes to be voted on by the General Assembly.

Article V of IUTAM's Statutes as it stands:

In voting every member of the General Assembly shall dispose of one vote. For an alteration of the Statutes the majority required is 2/3 of the votes brought forward. For all other decisions a simple majority of the votes brought forward is required. Any member who is unable to attend a meeting may by a letter to the Secretary General constitute another member of the General Assembly as proxy.

Between meetings of the General Assembly voting may be carried out by correspondence upon proposals made by the Bureau (Article XI); in this case decisions will be valid only provided the number of persons taking part in the vote is not less than 2/3 of the total membership of the General Assembly.

Amendment proposed by the IUTAM Bureau:

In voting every member of the General Assembly shall dispose of one vote. For an alteration of the Statutes the majority required is 2/3 of the votes brought forward. For all other decisions a simple majority of the votes brought forward is required. Any member who is unable to attend a meeting may by a letter or notification via electronic mail to the Secretary General constitute another member of the General Assembly as proxy.

Between meetings of the General Assembly voting may be carried out by correspondence or by electronic means upon proposals made by the Bureau (Article XII); in this case decisions will be valid only provided the number of persons taking part in the vote is not less than 2/3 of the total membership of the General Assembly.

It was noted that the final decision on this change of Statutes would be made in the second session under Item 24.

Item 15 – The Batchelor Prize in Fluid Mechanics and the Rodney Hill Prize in Solid Mechanics

The President explained the Batchelor Prize (Fluid Mechanics) and the Rodney Hill Prize (Solid Mechanics), and reported that the compositions of the Prize Committees were being finalized between the recommendations of the Bureau and XCCC and the sponsors of the Prizes, Cambridge University Press/Journal of Fluid Mechanics and Elsevier, respectively.

The meeting then adjourned.

The meeting reconvened on 24 July 2018 at 14:00.

Item 8 – Matters concerning Associate Organizations (resumed)
Additional explanations concerning the Associate membership of Cyprus were provided and discussed. During the discussion, the Cyprus Mathematical Society, the current Adhering Associate Organization, was encouraged to apply for membership as an Adhering Organization.

The General Assembly did not agree to extend the Associate membership of Cyprus by an additional 4-year period.

Item 16 – Election of members of the Congress Committee
These elections were held as prescribed by the recommendations of the NSCC. The Secretary of the Congress Committee, Professor R.M. McMeeking, conducted the elections.

The General Assembly unanimously agreed to maintain the Congress Committee at the size of 34 members.

The General Assembly decided to re-elect to a 2nd term of membership, from 1st November 2018 to 31st October 2022, the following persons as members of the Congress Committee:

Prof. Davide Bigoni (Italy)
Prof. Michael Gilchrist (Ireland)
Prof. Paul Linden (UK)
Prof. Sanjay Mittal (India)
Prof. Jianxiang Wang (China)

The General Assembly decided to elect the following persons as members of the Congress Committee for the period from 1st November 2018 to 31st October 2022:

Prof. Alan Cocks (UK)
Prof. Anne De Wit (Belgium)
Prof. Anne Juel (UK)
Prof. Detlef Lohse (Netherlands)
Prof. Shu Takagi (Japan)
Prof. Wei-Chung Wang (China-Taipei)

The new membership of the Congress Committee is recorded in the following list:

Prof. P. (Pilar) Ariza, Spain, 2020
Prof. N. (Nadine) Aubry, USA, 2020, Chair of CC and XCCC (ex officio)

Prof. L. (Leslie) Banks-Sills, Israel, 2020, member of XCCC
Prof. D. (Davide) Bigoni, Italy, 2022
Prof. S. (Shiyi) Chen, China, 2020
Prof. A. (Alan) Cocks, UK, 2022
Prof. A. (Alberto) Corigliano, Italy, 2020, member of XCCC (ex officio)
Prof. A. (Anne) De Wit, Belgium, 2022
Prof. B. (Bruno) Eckhardt, Germany, 2020, member of XCCC
Prof. H. (Horacio) Espinosa, USA, 2020
Prof. J.M. (Maciej) Floryan, Canada, 2020
Prof. H. (Huajian) Gao, USA, 2020
Prof. M.D. (Michael) Gilchrist, Ireland, 2022
Prof. P. (Patrick) Huerre, France, 2020
Prof. P. (Peter) Hunter, New Zealand, 2020
Prof. A. (Anne) Juel, UK, 2022
Prof. A. (Ann) Karagozian, USA, 2020
Prof. D. (Djimedo) Kondo, France, 2020
Prof. P.F. (Paul) Linden, UK, 2022
Prof. D. (Detlef) Lohse, Netherlands, 2022
Prof. T.J. (Tianjian) Lu, China, 2020
Prof. J. (Jacques) Magnaudet, France, 2020, member of XCCC
Prof. V. (Valery) Matveenko, Russia, 2020
Prof. R.M. (Robert) McMeeking, USA, 2020, Secretary of CC and XCCC
Prof. S. (Sanjay) Mittal, India, 2022
Prof. H. (Henryk) Petryk, Poland, 2020
Prof. M.V. (Maria) Salvetti, Italy, 2020
Prof. E.S.G. (Eric) Shaqfeh, USA, 2020
Prof. G. (Gábor) Stépán, Hungary, 2020, member of XCCC
Prof. S. (Shu) Takagi, Japan, 2022
Prof. J. (Jens) Walther, Denmark, 2020
Prof. J.-X. (Jianxiang) Wang, China, 2022
Prof. W.-C. (Wei-Chung) Wang, China-Taipei, 2022
Prof. H. (Hiroshi) Yabuno, Japan, 2020.

Item 17 – Future IUTAM endorsed events

The Secretary-General presented the list of four events endorsed in 2018 and of several future conferences to be organized by Affiliated Organizations which can be endorsed by IUTAM.

Item 18 – Matters concerning Inter-Union Committees

In response to a letter with an invitation to strengthen the engagement of IUTAM with the ICSU Committee on Data for Science and Technology (CODATA), the Bureau appointed a candidate, to be confirmed, for a representative of IUTAM in CODATA.

The Bureau had nominated Guruswami Ravichandran as the new IUTAM representative to the Committee on Space Research (COSPAR). Professor Ravichandran has submitted a report on COSPAR which is included in the IUTAM Report 2017.

Item 19 – Continued discussion and final decision regarding future IUTAM Symposia

The General Assembly decided to accept the ten IUTAM Symposia of rating R coded FL.01, FL.03, FL.05, FL.06, FS.01, FS.02, FS.04, SO.01, SO.03, SO.07.

After further discussions on the remaining nine proposals, a vote was taken.

The following further five IUTAM Symposia were finally accepted: FL.02, FS.03, SO.04, SO.06, SO.08.

It was decided that an IUTAM grant would be provided to all accepted Symposia except those (FS.01, SO.03, SO.06) for which funding from IUTAM was not requested.

There was a discussion that Proposal Symposium FL.06 would better fit as a special event. It was agreed that the organizer would be encouraged to apply for changing FL.06 into a special event which would be considered for funding by the Bureau.

Item 20 – Continued discussion and final decision regarding future IUTAM Summer Schools on Mechanics

The General Assembly decided to accept the Summer Schools of rating R coded SSFS.02 and SSSO.01*, both with an IUTAM grant.*

Item 21 – Continued discussion and final decision regarding annual dues

Following discussions, *the General Assembly voted in favor of the following amounts for the units of dues (no increase):*
US $ 810 in 2020,
US $ 810 in 2021.

Item 22 – Election of members of the Electoral Committee

The General Assembly elected unanimously the following persons as the members of the Electoral Committee:

Professors Nadine Aubry (USA, chair, *ex officio*), Ben Freund (USA), Timothy Pedley (UK), Werner Schiehlen (Germany), Wei Yang (China).

Item 23 – Election of members of Symposia Panels

With reference to the discussion under item 12, *the General Assembly elected the following members of Symposia Panels for the period 2018 to 2022:*

- Professor Rama Govindajaran (India) – reappointed to the Fluid Mechanics Panel
- Professor Ann Karagozian (USA) – appointed to the Fluid Mechanics Panel
- Professor Tianjian Lu (China) – reappointed to the Solid Mechanics Panel
- Professor Leslie Banks-Sills (Israel) – appointed to the Solid Mechanics Panel.

Item 24 – Final decision regarding the change of Statutes concerning voting by electronic means

The amendment was adopted by the General Assembly.

Item 25 – Date and venue of the next General Assembly meeting

The General Assembly agreed to hold its next meeting during the 25th ICTAM in Milan, Italy, on Tuesday, August 25, and on Wednesday, August 26, 2020.

Item 26 – Any other business

Nothing to report.

Then, the President closed the meeting.

Henryk Petryk, Secretary-General

2018 Treasurer's Report

Statement of Change in Fund Balance	**U.S. Dollars**
Balance, 31 December 2017	598.349,97
Net revenues minus expenses for 2018	22.419,11
Balance, 31 December 2018	**620.769,08**

Statement of Cash Revenues Collected over Expenses Paid	
Revenues collected during 2018:	
Subscription dues	138.859,32
Interest income	650,86
Total	**139.510,18**
Expenses paid during 2018:	
IUTAM Symposia	51.941,46
Travel, Bureau	11.401,92
Travel, Executive Committee of Congress Committee	6.643,63
Travel, others	6.672,92
Contribution to ICSU	4.750,42
Auditor's fee	2.979,46
Administration Website	5.973,04
Bank fees	476,78
Insurance	1.627,08
Office costs Secretary General	18.315,33
Total	**110.782,04**
Revenues minus expenses for 2018	**28.728,14**
Gain from exchange of currency	-6.309,03
Net revenues minus expenses for 2018	**22.419,11**

IUTAM Bank Accounts 2018

Running Accounts

Bank	Balance 31 Dec. 17	Withdrawals 2018	Deposits 2018	Balance 31 Dec. 18	Currency
Spar Nord Bank Aalborg 9236 457 73 07097*	463.073,03	113.774,59	141.927,21	491.225,65	USD
Spar Nord Bank Aalborg 9236 457 73 07089	3.342,72	0,00	0,00	3.342,72	EUR
Spar Nord Bank Aalborg 9236 457 22 92520	657,23	100,00	0,00	557,23	DKK
Nordea Bank Horsholm 6887 390 760 (Account not used but required by the bank)	0,00	0,00	0,00	0,00	DKK
Nordea Bank Horsholm 0745 417 701	0,00	300,00	3.997,91	3.697,91	DKK

Savings Account

Bank	Balance 31 Dec. 17	Withdrawals 2018	Deposits 2018	Balance 31 Dec. 18	Currency
Nordea Bank Horsholm	817.500,00	0,00	0,00	817.500,00	DKK

Treasurer:
Professor Peter Eberhard, Institute of Engineering and Computational Mechanics, University of Stuttgart, Pfaffenwaldring 9, 70569 Stuttgart, Germany

Assistant Treasurer:
Professor Niels Olhoff, Department of Mechanical and Manufacturing Engineering, Aalborg University, Fibigerstraede 16, DK-9220 Aalborg East, Denmark

Payment of Dues Record 2018

Adhering Organization	*2014*	*2015*	*2016*	*2017*	*2018*
Armenia*				1	
Australia	3	3	3	3	3
Austria	1	1	1	1	1
Belgium	5	5	5	5	-
Brazil	3	3	3	3	3
Bulgaria	1	1	1	1	1
Canada	8	8	8	8	8
Chile	1	1	1	1	1
China/Beijing	8	8	8	12	12
China/Hong Kong	1	1	1	1	1
China/Taipei	3	3	3	3	3
Croatia	1	1	1	1	1
Cyprus***		1			
Czech Republic	1	1	1	1	1
Denmark	3	3	3	3	3
Egypt	1	1	-	-	-
Estonia	1	1	1	1	1
Finland	3	3	3	3	3
France	8	8	8	8	8
Georgia**	1	1	1	-	-
Germany	8	8	8	8	8
Greece	1	1	1	1	1
Hungary	1	1	1	1	1
India	5	5	5	5	5
Ireland	1	1	1	1	1

Israel	3	3	3	3	3
Italy	8	8	8	8	8
Japan	8	8	8	8	8
Korea	1	1	1	1	1
Mexico	1	1	1	1	1
Netherlands	3	3	3	3	3
New Zealand	1	1	1	1	1
Norway	1	1	1	1	1
Poland	3	3	3	3	3
Portugal	1	1	1	1	1
Romania	1	1	1	1	1
Russia	8	8	8	8	8
Saudi Arabia	-	-	-	-	-
Serbia	1	1	1	1	1
Slovenia	1	1	1	1	1
South Africa	1	1	1	1	1
Spain	1	1	1	1	1
Sweden	5	5	5	5	5
Switzerland	3	3	3	3	3
Turkey	1	1	1	-	-
Ukraine	1	1	1	1	1
United Kingdom	8	8	8	8	8
United States	12	12	12	12	12
Vietnam	1	1	1	1	1

Note: For any particular year, a dash (–) indicates that dues had not been paid as of December 31, 2018. Dues are expressed in membership units of 1, 3, 5, 8 or 12, corresponding to category of membership from I through V, respectively.

* Armenia entered IUTAM as an Associate Adhering Organization in 2017.

** Georgia paid partially (about half) in 2017.

*** Cyprus entered IUTAM as an Associate Adhering Organization in 2011 and renewed this in 2015.

Latvia's and Slovakia's memberships were suspended in 2014,
Argentina's and Morocco's memberships were already suspended earlier.

Peter Eberhard, Treasurer

Reports on Affiliated Organizations

AFMC (Asian Fluid Mechanics Committee)
https://acfm.iisc.ac.in

AFMC was conceived in late 1970s to increase interaction among fluid mechanics community in Asia. Its main activity is organizing the Asian Congress of Fluid Mechanics (ACFM) every 2-3 years. The first ACFM was held in 1980 in Bengaluru, India and since then 14 more congresses have been organized so far. Past Congresses venues are: Bangalore, Beijing, Tokyo, Hong Kong, Daejeon, Singapore, Chennai, Shenzhen, Isfahan, Peradeniya, Kuala Lumpur, Daejeon, Dhaka, Hanoi and Kuching. ACFMs have helped in advancing fluid mechanics research in Asia and in establishing links between Asian and international scientists.

The 16th ACFM will be held in Bengaluru India during 13-17 December 2019. The venue is the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru. Call for papers is out and 31 May 2019 is the deadline for submissions. Technical program details will be worked out after the paper acceptance.

Report composed by G. S. Bhat

BICTAM (Beijing International Center for Theoretical and Applied Mechanics)
www.bictam.org.cn

BICTAM promotes the development and application of mechanics and related interdisciplinary branches in the Asia-Pacific region and around the world via symposia, conferences, workshops and publications in 2018. These programs mainly focused on computational mechanics, acoustic/elastic metamaterials, structural and multidisciplinary optimization, microfluidics, nanofluidics and lab on a chip, etc. Over 1000 researchers and graduate students participated in these programs.

BICTAM has a series of brand programs, including “Asia-Pacific Youth Symposium”, “BICTAM Summer School”, “BICTAM Master Lecture Series on Mechanics” and “Sino-Thai Bilateral Workshop”. These brand activities serve as great academic exchange platforms as well as providing chances for collaboration for young scholars.

Symposia

Symposium on Computational Mechanics Based Engineering and Science

The Symposium on Computational Mechanics Based Engineering and Science, which was also regarded as part of the 13th World Congress in Computational Mechanics, was held in New York, United States on July 23-25, 2018. Lectures focused on numerical methods, structure and multidisciplinary optimization, biomechanics, micro/nano-mechanics were delivered during this symposium. This symposium not only provided academic exchange opportunities for researchers in the Asia-Pacific region, but also improved the advancement of mechanics in this region.

The 3rd Symposium for Asia-Pacific Young Scholars

The 3rd Symposium for Asia-Pacific Young Scholars was held in Sendai, Japan on September 25-28, 2018. During the symposium, four invited lectures covering microfluid mechanics, experimental fluid mechanics, computational mechanics, etc. were delivered. A total of more than 30 participants from domestic and abroad exchanged their latest research views in various fields of mechanics.

Conferences

The 2nd International Conference of Microfluidics, Nanofluidics and Lab-on-a-Chip

This conference was sponsored by BICTAM, Institute of Mechanics of Chinese Academy of Sciences and Beijing University of Technology in Beijing, China on June 8-10, 2018. It was intended to provide a highly interactive forum to bring together researchers, engineers around the world with the aim of exchanging the knowledge of the state-of-art research and development in this field, and to inspire new efforts to advance the frontier of the research. Over 300 scientific researchers and engineers from 17 countries and regions gathered here. Seven distinguished plenary speeches were presented during the conference by scientists from around the globe. The 3rd International Conference of Microfluidics, Nanofluidics and Lab-on-a-Chip will be held in Shenzhen, China.

The 8th International Conference on Fluid Mechanics

The 8th International Conference on Fluid Mechanics (ICFM8) was held in Sendai, Japan on September 25-28, 2018. Topics of ICFM8 included hydrodynamics, environmental fluid mechanics, geophysical fluid mechanics, multiphase flows, non-Newtonian flows, flows in porous media etc. Nearly 80 scholars and students from 14 countries and regions attended the conference.

Workshop

The 2nd Sino-Thai Bilateral Workshop for Young Scholars in Theoretical and Applied Mechanics

The workshop is co-organized by BICTAM and the Faculty of Engineering, Chengdu University in Chengdu, China on November 16-18, 2018. It organized 2 parallel sessions with a total of 20 lectures on the topics of "Tuning Bandgaps in Soft Phononic Plates by Small Deformation", "Optimal Design for Grid-Tied Solar Power System with Battery-Ultracapacitor Hybrid Energy", "Scratch Behavior of 3D-Printed Polylactic Acid Texture Surface" etc. Over 40 participants from 15 universities and institutes attended this workshop.

Report composed by Yewen Zhang

CISM (International Centre for Mechanical Sciences)
www.cism.it

1. Courses and Seminars

The regular programme of courses and seminars, planned for the Centre for 2018 by the Scientific Council, took place in two Scientific Sessions, the Stephen C. Cowin Session (April-July 2018) and the Bruno A. Boley Session Session (September-October 2018). The topics, always at an advanced level, included different field of mechanics and related sciences, both at a basic and applied level. Besides one International Advanced Professional Training course was organized (June).

The Stephen C. Cowin Session
- Fluid Mechanics of Planets and Stars
- Transport Phenomena in Complex Fluids
- Mechanics of Strain Gradient Materials
- High-performance Computing of Big Data for Turbulence and Combustion
- Modelling and Simulation of Tribological Problems in Technology
- Advanced Topics in MHD
- Wave Turbulence and Extreme Events
- Turbulent Mixing in Stratified Flows
- Fluid Dynamics Effects on Particle Formation in Crystallization Processes
- Mechanics of Fibrous Materials and Application: Physical and Modelling Aspects
- CISM-ECCOMAS International Summer School on "Efficient High-order Discretizations for Computational Fluid Dynamics"

- Substructuring in Engineering Dynamics: Emerging Numerical and Experimental Techniques

The Bruno A. Boley Session
- Thermodynamics of Irreversible Processes in Material Systems
- CISM-AIMETA Advanced School on "Cell Mechanobiology: Theory and Experiments on the Mechanics of Life"
- Modeling in Engineering using Innovative Numerical Methods for Solids and Fluids

The International APT course
- Advanced After-treatment Technologies for Automotive Applications

2. National APT Courses

A series of courses on Advanced Professional Training (APT) in the fields of structural and geotechnical engineering, environmental, surveying, industrial engineering and bioengineering were given in Italian.

3. Editorial Activities

The lectures of several courses held at CISM are published in book form and distributed by Springer Verlag Vienna-New York.
The following books were published in 2018:
P. Lugner: “Vehicle Dynamics of Modern Passenger Cars”
G. Ovarlez – S. Hormozi: “Lectures on Visco-Plastic Fluid Mechanics”
V. Arakelian – P. Wenger: “ROMANSY 22 – Robot Design, Dynamics and Control”
A. Popp – P. Wriggers: “Contact Modeling for Solids and Particles”
D. Bigoni – O. Kirillov: “Dynamic Stability and Bifurcation in Nonconservative Mechanics”
S. Forest – S. Mesarovic – H. Zbib: “Mesoscale Models”
S. Lenci – G. Rega: “Global Nonlinear Dynamics for Engineering Design and System Safety”

4. Scholarships

A number of scholarships, including free lodging and boarding or exemption from registration fee, was offered during the course to participants who were not supported by their home institutions, priority being given to young researchers coming from countries that contribute to CISM’s operating resources.

5. International Participation

In 2018, 97 lecturers from 17 countries delivered lecturers in the Stephen C. Cowin and Bruno A. Boley Sessions. The courses were attended by 453 participants coming from 38 countries.

Report composed by Bernhard Schrefler

EUROMECH (European Mechanics Society)
www.euromech.org

EUROMECH - European Mechanics Society is an international non-governmental non-profit scientific organization. The objective of the Society is to engage in all activities intended to promote in Europe the development of mechanics as a branch of science and engineering. The society is governed by the Council whose members are being elected according to rules set in the Statutes.

EUROMECH meetings

The EUROMECH Council has overall responsibility for EUROMECH Colloquia and EUROMECH Conferences

EUROMECH Colloquia are informal meetings on specialized research topics. Participation is restricted to a small number of research workers (30-50) actively engaged in the field of each Colloquium. The organization of each Colloquium, including the selection of participants for invitation, is entrusted to a Chairperson. Proceedings are not normally published. Those who are interested in taking part in a Colloquium should contact the appropriate Chairperson.

EUROMECH Conferences are broad in scientific scope. They comprise
- European Fluid Mechanics Conference (EFMC), held every two years;
- European Mechanics of Materials Conference (EMMC), held every two years;
- European Nonlinear Oscillations Conference (ENOC), held every three years;
- European Solid Mechanics Conference (ESMC), held every three years;
- European Turbulence Conference (ETC), held every two years.

They are open to all those interested and generally have a number of participants between 250 and 1000, although in some cases the latter number has been exceeded substantially. The general purpose is to provide opportunities for scientists and engineers to meet and discuss current research. The responsibility for each series of Conferences is delegated to a Standing Conference Committee. The organizational

work is carried out by Local Organizing Committees (LOC). Those who are interested in taking part in one of the Conferences should register through the conference website or contact the Chairman or Secretary of the appropriate LOC.

Prizes and Fellowships

The EUROMECH Fluid Mechanics Prize and the EUROMECH Solid Mechanics Prize are awarded on the occasions of the Fluid and Solid Mechanics conferences for outstanding and fundamental accomplishments in mechanics. At those conferences, Fellowships are awarded to members who have contributed significantly to the advancement of mechanics and related fields. Also, Young Scientist Prizes are awarded at these conferences to the best oral presentations.

EUROMECH Colloquia in 2018

[593] *Plasma-based actuators for flow control: recent developments and future directions*, 14 – 16 March 2018, Delft, The Netherlands.

[594] *Bone remodeling: multiscale mechanical models and multiphysical aspects*, 15 – 19 May 2018, Nancy, France.

[596] *Numerical simulations of flows with particles, bubbles and droplets*, 9 – 11 May 2018, Venice, Italy.

[597] *Reduced Order Modeling in Mechanics of Materials*, 28 – 31 August 2018, Bad Herrenalb, Germany.

[598] *Coherent structures in wall-bounded turbulence: new directions in a classic problem*, 29 – 31 August 2018, London, UK.

[599] *Rotating convection: from the lab to the stars*, 28 May – 5 June 2018, Leiden, The Netherlands.

[601] *Micromechanics of Defects in Crystalline Solids and Metals*, 11 – 15 June 2018, Sevilla, Spain.

[603] *Dynamics of micro and nano electromechanical systems: multi-field modelling and analysis*, 5 – 7 September 2018, Porto, Portugal.

EUROMECH Conferences in 2018

EMMC16 - *16th European Mechanics of Materials Conference*, 26 – 28 March 2018, Nantes, France.

ESMC10 - *10th European Solid Mechanics Conference*, 2 – 6 July 2018, Bologna, Italy.

EFMC12 - *12th European Fluid Mechanics Conference*, 9 – 13 September 2018, Vienna, Austria.

For more details see www.euromech.org

Report composed by Jacques Magnaudet

HYDROMAG (International Association for Hydromagnetic Phenomena and Applications)
https://hydromag.wordpress.com

HYDROMAG is an international association of scientists and engineers active in these fields of research which involve the flow of fluids in the presence of a magnetic fields, namely magnetohydrodynamics (MHD), electromagnetic processing of materials (EPM) and dynamics of magnetic fluids (MF). HYDROMAG promotes growth and visibility of the field of hydromagnetics and stimulates exchanges between its members throughout the world via conferences, workshops, summer schools and publications. Detailed information on HYDROMAG can be accessed under

https://hydromag.wordpress.com/

This WWW-site contains information on membership, forthcoming conferences and the electronic HYDROMAG newsletter.

The year 2018 has seen the run-up to the PAMIR conference on magnetohydrodynamics, the largest conference in the field, to be held in Reims, (France), July 1-5, 2019, and involving Hydromag. In particular, Hydromag oversees the Best Poster Prize associated to that conference as it did in the previous edition, in Cagliari (2016).

Additionally, Hydromag has been awarded the join organisation of a thematic session on EHD and MHD at the forthcoming ICTAM conference in Milan (2020). The session will be jointly chaired by Hydromag Committee members Prof. Alban Pothérat (Coventry University) and Prof. Laurent Davoust (Grenoble-Alpes University).

Report composed by Alban Pothérat

IABEM (International Association for Boundary Element Methods)
www.iabem.org

The International Association for Boundary Element Methods (IABEM) is an open community, where everybody working on boundary element methods or boundary integral equations is welcome independent of her/his scientific field. Consequently, there is no official membership or any fees. Details on IABEM can be found in http://www.iabem.org.

The main scientific activities of IABEM are found in the biannual IABEM symposia in addition to minisymposia in related conferences or workshops in the field of BEM. In June 2018, the IABEM symposium has been held in Paris, France with 136 attendees. The next symposium is planned to be in Hong Kong, China in 7-9 April, 2020.

Report composed by Naoshi Nishimura

IACM (International Association for Computational Mechanics)
https://iacm.info

***WCCM XIII was held in 2018*:**

The ***13th World Congress on Computational Mechanics*** was jointly organized with the ***2nd Pan American Congress on Applied Mechanics*** in
22 - 27 July 2018, New York, USA

Further details are available at: http://www.wccm2018.org/

***FEF- IACM conference took place this year*:**

20th International Conference on Finite Elements in Flow Problems - FEF 2019
Chicago, USA, March 31 - April 3, 2019

***The following IACM Special Interest Conferences will take place this year*:**

8th International Conference on Computational Methods in Marine Engineering - Marine 2019
13-15 May 2019 / Gothenburg, Sweden

IX International Conference on Adaptive Modeling and Simulation - ADMOS 2019
27-29 May 2019 / El Campello, Alicante, Spain

8th International Conference on Coupled Problems in Science and Engineering - COUPLED PROBLEMS 2019
3-5 June 2019 / Sitges, Spain

15th International Conference on Computational Plasticity. Fundamentals and Applications - COMPLAS 2019
4-6 September 2019 / Barcelona, Spain

2nd International Conference on Simulation for Additive Manufacturing – Sim-AM 2019
18-20 September 2019 / Munich, Germany

International Conference on Isogeometric Analysis - IGA 2019
11-13 September 2019 / Pavia, Italy

6th International Conference on Particle-Based Methods. Fundamentals and Applications - PARTICLES 2019
28-30 October 2019 / Barcelona, Spain

9th International Conference on Textile Composites and Inflatable Structures - Structural Membranes 2019 & IASS Conference - Form & Force 2019
7-10 October 2019 / Barcelona, Spain

***Next IACM World Congress will take place next year*:**

The ***14th World Congress on Computational Mechanics*** will be jointly organized with the ***8th European Congress on Computational Methods in Applied Sciences and Engineering***
19 - 24 July 2020, Paris, France

Further details are available at: https://www.wccm-eccomas2020.org/frontal/

Report composed by Cristina Vizcaya

IASCM (International Association for Structural Control and Monitoring)

The *International Association of Structural Control and Monitoring* (IASCM) represents the diverse and interdisciplinary community of international researchers engaged in advancing the state-of-art in structural control and monitoring technologies. The mission of IASCM is to accelerate the advancement of the science and practice of structural control and monitoring, by means of education, research,

and application of knowledge. This includes the response of large-scale structures to earthquakes, wind, and man-made forces.

The major activity of IASCM in 2018 consisted of convening the *Seventh World Conference on Structural Control and Monitoring* (***7WCSCM***) in Qingdao, China, during the period 22-25 July 2018. The Conference was hosted by Harbin Institute of Technology. The World Conference on Structural Control and Monitoring (WCSCM) is a premier leading conference, under the auspices of IACSM. The WCSCM, held every four years, is aimed at promoting advanced structural control and monitoring technology for a variety of civil, mechanical, aerospace and energy systems. During 7WCSCM, 15 Keynote presentations were made; 39 Special Sessions were organized including three National Sessions (Japan, Australia and China); about 600 abstracts and 400 papers were submitted; more than 530 oral presentations were made in 67 sessions; and almost 800 participants from 24 countries attended the Conference. The conference provided the international research community a platform to contribute to the state of the art in such multidisciplinary scientific and engineering environment with new results, fresh ideas and future perspectives. Further details about 7WCSCM are available through the Conference website: http://smc.hit.edu.cn/wcscm2018

The preceding world conferences of IASCM have been held in Pasadena - USA (1994), Kyoto - Japan (1998), Como - Italy (2002), La Jolla - USA (2006), Tokyo - Japan (2010) and Barcelona - Spain (2014).

Report composed by Sami F. Masri

IAVSD (International Association for Vehicle Systems Dynamics)
www.iavsd.org

IAVSD supported and participated in

- 9th International Munich Chassis Symposium, 12-13 June 2018, in Munich, Germany
- 14th International Symposium on Advanced Vehicle Control (AVEC'18), 16-20 July 2018, in Beijing, China

IAVSD started preparation on the

- 26th IAVSD Symposium on Dynamics of Vehicles on Roads and Tracks, 12-16 August 2019, in Gothenburg, Sweden. The IAVSD Symposium is a leading international symposium bringing together researchers, scientists and engineers from academia and industry in the field of ground vehicle dynamics to present and exchange their latest ideas and breakthroughs. The organisers are the Department

of Mechanics and Maritime Sciences together with the Chalmers Railway Mechanics (CHARMEC) and the Vehicle and Traffic Safety Centre at Chalmers (SAFER). The symposium will include technical sessions and technical visits and 5 SoA presentations to be published in *Vehicle System Dynamics*.

- 3rd IAVSD Workshop on "Connected and Automated Vehicles", 28-30 April 2019, in Ann Arbor, Michigan, USA. This workshop is organised by the departments of Mechanical Engineering, Aerospace Engineering, Naval Architecture & Marine Engineering, Civil and Environmental Engineering, Electrical Engineering and Computer Science, as well as the College of Engineering at the University of Michigan, and Toyota Research Institute.

Report composed by Manfred Plöchl

ICA (International Commission for Acoustics)
www.icacommission.org

1. ICA Governance. The ICA is composed of the acoustical societies from member countries plus international affiliate organizations which themselves have individual members distributed across the world and also organize international conferences every one or two years.

Since October 1, 2016, and following the elections held during the General Assembly held in Buenos Aires, the new board consists of the following members: The executive: President Michael Taroudakis (Greece), Vice-President Jeong-Guon Ih (Korea), Secretary General Michael Stinson (Canada), Treasurer Antonio Perez Lopez (Spain), Past-President Marion Burgess (Australia). The remainder of the board are Julio Cordioli (Brazil), Dorte Hammershøi (Denmark), Bertrand Dubus (France), Martin Ochmann (Germany), Antonino Di Bella (Italy), Kohei Yamamoto (Japan), Grazyna Grelowska (Poland), Monika Rychtarikova (Slovakia), Kerstin Persson Waye (Sweden) and Mark Hamilton (USA). Thus the 15 member board contains 5 females.

The ICA is now composed of 47 Member Societies, 8 International Affiliate Members, and 5 Observer Members.

The 2018 ICA Board meeting was held in Hersonissos, Crete, on the 31st May 2018. The meeting venue was Creta Maris Conference Center, host of the EURONOISE 2018 Conference which was held 27-31 May 2018. Apart from the management of the ICA two important matters were under consideration. At this meeting the modified statutes of the ICA to be presented at the Spanish authorities for the registration of the

ICA under the Spanish law were approved. As well the roadmap for the International Year of Sound 2020 was prepared.

2. International Year of Sound 2020

Following the 2018 ICA Board Meeting in Crete, it was agreed to pursue the IYS 2020 as an outcome of the UNESCO Resolution No. 39 C / 49 "The Importance of Sound in the World Today: Promoting Good Practice" which was an initiative of La Semaine du Son, adopted by all UNESCO countries. Further approaches were made to UNESCO to obtain the direct endorsement of the IYS 2020 and while that was not refused, neither was it received. So later in 2018 it was agreed to proceed with the organization of the IYS 2020 in collaboration with La Semaine du Son.

An agreement has been signed with La Semaine du Son and preparations are now underway for the organization of the events of the International Year of Sound. These events will include:

- Centrally organized broad area events/outcomes funded by ICA and sponsors
- Those organized and funded in the normal manner for La Semaine du Son with some ICA member organisation participation
- Those organized and funded by ICA Member societies and organisations.

The events will be focused on outreach and education to highlight all the aspects of acoustics. The ICA has already created a dedicated website to promote and report on all the activities of the IYS 2020. The site can be reachable in ***https://sound2020.org*** The ICA is grateful for the support so far received by the IUTAM and hopes that it will assist by encouraging all the IUTAM community to consider activities promoting the IYS 2020. The website is www.sound2020.org and specific newsletters with updates on activities will be sent out to IUTAM during 2019 and 2020.

3. ICA Registration. The procedures for the ***official registration of the ICA under the Spanish law*** are underway. President Michael Taroudakis and Treasurer Antonio Perez-Lopez prepared the documents required by the Spanish Law in order that the Commission is formally registered. The new text of the ICA Statutes was compiled and sent to the member societies for comments. The text was approved by the ICA Board during the Hersonissos meeting and was presented at the Spanish Registry. The preparation of the text of the new Internal Regulations is underway. It is expected that the formal acceptance of the new Internal Regulations will be done by the General Assembly in Aachen during the ICA Congress in 2019.

4. Symposium Support. The ICA allocates up to 5,000 EUROs annually for sponsorship of specialty symposia in acoustics. In conjunction with the Acoustical Society of America (ASA), the ICA accepts the applications for allocation of up to

2,000 USD for specialty symposia that comply with the conditions for the special ASA support.

The ICA decides about the sponsorship of symposia a year before the event. Thus the decision on Symposia to be held in 2018 were decided in 2017. There were 11 applications for 2018 funding from the ICA/ASA Specialty Symposia sponsorship program. These applications were evaluated by a committee comprised of the ICA Executive and the ASA Committee on International Research & Education and the funding allocations approved by the ICA Board. Those not receiving some funding were provided with ICA endorsement.

The symposia received some ICA funding for 2018 were:

- 8th Congress of Alps Adria Acoustics Association (Croatia)
- XI Iberoamerican Congress on Acoustics, 49th Spanish Congress on Acoustics, X Iberian Encounter on Acoustics (FIA -- Spain & Portugal)
- Baltic-Nordic Acoustic Meeting (Iceland)
- WESPAC 2018 (India)
- 8th International Conference on Acoustics & Vibration (Iran)
- 22nd Conference on Acoustic and Biomedical Engineering (Poland)
- 4th International Conference on Synthetic Aperture Sonar and Synthetic Aperture Radar (UK)
- 10th International Conference on Auditorium Acoustics (UK)
- International Symposium on Nonlinear Acoustics (USA).

5. ICA Congress

Preparations are under-way for the next ICA Congress which is the major event organized by the ICA. The next ICA Congress (***23rd ICA congress***) will be held in the historical city of ***Aachen, Germany, 9-13 September 2019***. This congress is jointly organized by the German Acoustical Society, DEGA, and the European Acoustics Association, EAA. EAA's EUROREGIO conference with its "EAA Summer School" for young acousticians will integrated into ICA 2019. It will be held in Leuven, Belgium with a series of special training courses for both undergraduate students and students on MSc and PhD level. The technical congress program will include plenary lectures as well as keynote, invited, contributed, and poster papers covering all aspects of acoustics.

The Organizers invited distinguished scientists to co-ordinate the preparation of the structured and normal sessions for the Congress, by suggesting structured session topics and chairs. This month the final structure of the Congress will be decided to start the paper submission process.

Two satellite events are associated with ICA/EUROREGIO 2019:

- ISRA 2019 – International Symposium on Room Acoustics, Concertgebouw Amsterdam (https://www.concertgebouw.nl/en/history), and
- ISMA 2019 – International Symposium on Musical Acoustics, Detmold, Germany (http://www.hfm-detmold.de/en).

The Congress Chairman is ***Prof. Michael Vorländer*** (RWTH Aachen University) former President of the ICA.
More information on the Congress can be found on the website www.ica2019.org.

Report composed by Michael Taroudakis and Marion Burgess

ICF (International Congress on Fracture)
www.icfweb.org

The 15th International Conference on Fracture will take place in Atlanta, Georgia, USA between June 13-18, 2021. Downtown Atlanta is the heart of the 9th largest metro area in the United States. Atlanta has flights offering non-stop service to more than 150 U.S. destinations and 60 international destinations and boasts many world-class attractions, making it the 7th most visited city in the U.S. The conference will be hosted at the Omni Hotel and the Georgia World Congress Center. Low cost housing will also be available in nearby Georgia Tech dormitories.

The conference is held every four years, and ICF15 will be returning to the continental United States after 32 years. It will focus on the latest interdisciplinary research in the field of fracture and is a must attend event for senior and young researchers, students, post-doctoral fellows, and industry professionals working in the field of fracture throughout the world. The web site may be found at www.icf15.org

The ICF15 program can accommodate up to 20 symposia. Select papers from the symposia will be published in special volumes of international journals with the symposium organizers serving as guest editors. Researchers who wish to organize symposia for the conference's technical program should submit a two page proposal listing the significance of the topic, number of anticipated papers, and names of likely participants. Proposals are due by June 30, 2019 via email to icf15@gatech.edu

Report composed by Leslie Banks-Sills

ICHMT (International Centre for Heat and Mass Transfer)
www.ichmt.org

ICHMT organized one international symposium and sponsored four in 2018. Details of these meetings can be found on the web site, http://www.ichmt.org.

Meetings Organized by ICHMT:

"9th International Symposium on Turbulence Heat and Mass Transfer, THMT-18", 10 – 13 July 2018, in Rio de Janeiro, Brazil. The Symposium Chairman was Professor Átila P. Silva Freire, Federal University of Rio de Janeiro, Brazil.

Meetings Co-Sponsored by ICHMT:

"The Eleventh International Conference on Thermal Engineering Theory and Applications, ICTEA-2018", 25 – 27 February 2018, Doha, Qatar. The Symposium Co-Chairmen were Professor Ibrahim Galal Hassan, Texas A&M University, Qatar, Yousef Haik, Hamad Bin Khalifa University, Qatar and Professor Ziad Saghir, Ryerson University, Canada.

"3rd Thermal and Fluids Engineering Conference, TFEC-2018", 4 – 7 March, 2018, Fort Lauderdale, FL, USA. The symposium Chairman was Dr. Yong Tao, Nova Southeastern University, USA.

"16th International Heat Transfer Conference, IHTC-16", 10 – 15 August 2018, Chinese National Convention Center, Beijing, China. The symposium Chairman was Prof. Ping Cheng, Shanghai Jiao Tong University, China.

"X Minsk International Seminar Heat Pipes, Heat Pumps, Refrigerators, Power Sources", 10 – 13 September 2018, Minsk, Belarus. The symposium Chairman was Professor Leonard L. Vasiliev, Luikov Heat & Mass Transfer Institute, Belarus.

The organization of several future meetings have continued. These are:

"The Twelfth International Conference on Thermal Engineering Theory and Applications, ICTEA-2019", 23 – 26 February 2019, Gandhinagar, Gujarat, India. The Symposium Co-Chairmen are Professor Surrendra Singh Kachhwaha, Pandit Deendayal Petroleum University, India and Professor Ziad Saghir, Ryerson University, Canada. Detailed information can be found on the Web site:
http://www.ictea.ca/

"4th Thermal and Fluids Engineering Conference, TFEC-2019", 14 – 17 April 2019, Westin Las Vegas Hotel & Spa, Las Vegas, NV, USA. The Symposium Co-Chairman is Dr. Darrell W. Pepper, University of Nevada, USA. Detailed information can be found on the Web site: http://www.astfe.org/tfec2019/

"The 9th International Symposium on Radiative Transfer, RAD-19", 3 – 7 June, 2019, Athens, Greece. The symposium Chairmen are Prof. Brent Webb, Brigham Young University, USA and Dr. Denis Lemonnier, ISAE-ENSMA, France. Detailed information can be found on the Web site: www.ichmt.org/rad-19

"11th Mediterranean Combustion Symposium, MCS-11", 16 – 20 June, 2019, Tenerife, Spain. The symposium Co-Chairmen are Dr. Federico Beretta, Consiglio Nazionale delle Ricerche, Napoli, Italy; Prof. Nevin Selcuk, Middle East Technical University, Ankara, Turkey; Prof. Mohy S. Mansour, American University in Cairo, Egypt and Prof. Andrea d'Anna, Università degli Studi di Napoli Federico II, Naples, Italy. Detailed information can be found on the Web site: https://www.combustioninstitute.org/ci-event/11th-mediterranean-combustion-symposium/

"14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT-2019", 22 – 24 July, 2019, Wicklow, Ireland. The symposium Chairman is Professor Josua Meyer, University of Pretoria, South Africa. Detailed information can be found on the Web site: https://www.eiseverywhere.com/ehome/349879/752623/?&t=37e84e64acfd67aa345e8e3046e4d5ab

"5th International Workshop on Heat/Mass Transfer Advances for Energy Conservation and Pollution Control, IWHT-19", 13 – 16 August, 2019, Novosibirsk, Russia. The symposium Chairmen is Professor Aleksandr Pavlenko, Kutateladze Institute of Thermophysics, Russia and Prof. S.V. Alekseenko, Kutateladze Institute of Thermophysics, Russia. Detailed information can be found on the Web site: http://iwht2019.org

"7th METTI Advanced School on Thermal Measurement and Inverse Techniques", 29 September – 4 October 2019, Porquerolles island in Hyères, France. The symposium Chairman is Professor Denis Maillet, University of Lorraine, France. Detailed information can be found on the Web site: http://iusti.cnrs.fr/metti7/

"Turbulence, Heat and Mass Transfer, THMT-20", 6 – 9 July, 2020, St. Peteresburg, Russia. The symposium Chairmen are Professor Kemal Hanjalic, Dmitriy Markovich, Dmitrii Sikovsky. Web site is under construction.

"4th International Symposium on Heat Transfer in Gas Turbine Systems, TURBINE-20", 6 – 11 August 2020, Cesme, Turkey. The symposium Chairmen are Professor Richard Goldstein, University of Minnesota, USA and Professor Terrence W. Simon, University of Minnesota, USA. Web site is under construction.

Report composed by Tugba Gün

ICM (International Conference on the Mechanical Behaviour of Materials)
https://www.icm-13.com

The 13th ICM will be held at Melbourne, Australia on 11-14 June 2019. The venue of ICM-13 will be Storey Hall, RMIT University, Melbourne City (https://www.icm-13.com/). 250 abstracts were submitted as of March 2019. After the meeting, the president of ICM (International Conference on the Mechanical Behaviour of Materials) will be changed from Prof. Detlef Löhe (the Karlsruhe Institute of Technology) to Prof. Raj Das (RMIT University). Prof. Tilmann Beck (University of Kaiserslautern) newly joined the executive committee as "governors at large".

Report composed by Yoshihiko Uematsu

ICR (International Committee on Rheology)
http://icrheology.org/dat/index.html

The science of rheology is well-represented throughout the world. The major rheology meetings in North America, Europe, and Asia continue to attract greater numbers of registrants. The 2016 Congress in Kyoto attracted 800 participants from 42 countries. This healthy growth in the rheological community reflects the vital position of our science in addressing world-wide technological challenges in energy, the environment, and manufacturing.

The current roster of active member societies of the ICR can be found on the Committee's website (http://icrheology.org/dat/index.html) and includes representtation from 29 countries.

The XVIIIth International Congress on Rheology will be held at Rio de Janeiro, Brazil from August 2-7, 2020 (http://icr2020.com), organized by Brazilian Society of Rheology. Chairman of the Organizing Committee is Prof. R. L. Roney (UFRJ).

Beginning in 2023, the International Congresses on Rheology will be held on a 4 year cycle. This adjustment in scheduling was made to avoid overlap with the ICTAM meetings. The XIXth International Congress on Rheology will be held in Athens, Greece in August, 2023.

Report composed by Gerald G. Fuller

ICTS (International Congresses on Thermal Stresses)
http://ts2019.zju.edu.cn

While this short report is being prepared, there are going final preparations for the 12th International Congress on Thermal Stresses, or TS 2019, which will be held at Zhejiang University in Hangzhou, China, on June 1 to 5, 2019.

The principal local organizer and Chair is Weiqiu CHEN (chenwq@zju.edu.cn), and Co-Chairs are:
Richard B Hetnarski, Rochester Institute of Technology, USA,
and Naotake Noda, Shizuoka University, Japan.

The link to the extensive website of the Congress is http://ts2019.zju.edu.cn

An extensive report on TS 2019 will be published in the next year IUTAM Annual Report 2019.

The following 13th International Congress on Thermal Stresses, TS 2021, will be held in early June, 2021, at the University of Minnesota in Minneapolis, MN, U.S.A. More information will be published next year.

Report composed by Richard B. Hetnarski

IIAV (International Institute of Acoustics and Vibration)
www.iiav.org

No report has been submitted by IIAV.

IMSD (International Association of Multibody System Dynamics)
www.itm.uni-stuttgart.de/imsd

IMSD is a successor to the Joint International Conference on Multibody System Dynamics formed on May 26, 2010. It is the essential mission of the Association to establish biannual international conferences on multibody system dynamics that address computational mechanics, nonlinear dynamics and control design; to foster research on the dynamics of multibody systems and related fields; and to promote international cooperation between scientists and engineers in industry.

The IMSD conference is a biannual series that serves as a meeting point for the international multibody community and as an opportunity to exchange high-level, current information on the theory and applications of multibody systems. As a rapidly growing branch of engineering dynamics, Multibody System Dynamics is seeing more and more use, and is becoming increasingly important in the development of complex systems. The continual new challenges faced by the IMSD community demand productive conference forums where ideas are freely exchanged and a spirit of cooperation is encouraged.

Information about IMSD can be found at www.itm.uni-stuttgart.de/imsd including the activities, committees, bylaws, and more.

The year 2018 has been mainly devoted to The Fifth IMSD Conference, that took place in Lisbon, Portugal, on 24-28 June 2018 (http://imsd2018.tecnico.ulisboa.pt/). Approximately 220 attendees enjoyed 190 papers organized into 11 sessions:

- Applications, Multidisciplinary Methods, and Other Topics
- Benchmark Problems in Multibody System Dynamics
- Biomechanics
- Computational Methods and Real-Time Applications
- Contact, Impact, and Constraints
- Control, Mechatronics, and Robotics
- Dynamics of Vehicles
- Flexible Multibody Systems
- Modelling, Formalisms, and Theoretical Methods
- Multibody Kinematics
- Optimization, Sensitivity Analysis, and Parameter Identification

IMSD also promoted the 2018 Asian Conference on Multibody Dynamics (ACMD) held on August 19-23 in Xi'an China (http://acmd2018.sjtu.edu.cn/). Already, there are plans to jointly organize the 2020 IMSD Conference in India with ACMD 2020.

IMSD displays some information on the association at the end of each number of the Springer journal *Multibody System Dynamics* which is the official journal of IMSD. This journal is the leading publication organ in multibody system dynamics.

Notable members of the International Steering Committee for IMSD include:

Jorge Ambrosio, Chairman of IMSD
John McPhee, Vice-Chairman of IMSD
Javier Cuadrado, Secretary of IMSD
Peter Eberhard, Representative of IMSD in IUTAM GA
Werner Schiehlen, Representative of IUTAM in IMSD ISC

Report composed by John McPhee and Javier Cuadrado

ISIMM (International Society for the Interaction of Mechanics and Mathematics)

http://isimm.unipg.it

The International Society for the Interaction of Mechanics and Mathematics fosters the interaction of mathematics and mechanics. The Society was founded in 1977 in Kozubnik in Southern Poland. There had been a planning period before that time which had culminated in a meeting in Lecce, Apulia, Italy two years earlier. The organization of the STAMM the international meeting of the Society is one of the main activity.

The 2018 activity of the ISIMM was focused around XXI International Symposium of the Society. This event named *Mathematics & Mechanics: Natural Philosophy in the 21st Century* takes place in Oxford on June 24-27, 2018 in collaboration with the Society of Natural Philosophy. This will be the largest event organised yet by any of the two societies.

During this conference the ISIMM Prize 2018 (ISIMM Medal) has been awarded to Prof. John Ball and The ISIMM Junior Prize 2018 has been awarded to Dr. Matthias Liero from the Weierstraß-Institut für Angewandte Analysis und Stochastik.

A project for the special issue of the *International Journal of Non-linear Mechanics* with a title similar to the conference in Oxford has been initiated under the guidance of G. Tomassetti, A. Schlömerkemper and G. Saccomandi. The special issue will be out in 2019.

As of January 1st, 2017 the Executive Committee is composed as follows:
(i) Officers: G. Saccomandi (president), A. Visintin (vice-president), G. Tomassetti (secretary-treasurer).
(ii) Ordinary members: H-D. Alber, P. Colli, M. Kruzik, A. Miranville, A. Movchan, G. Mulone, E. Rocca, A. Schlömerkemper.

Report composed by Giuseppe Saccomandi and Alain Goriely

ISSMO (International Society for Structural and Multidisciplinary Optimization)
www.issmo.net

1. Upcoming ISSMO Biennial World Congress on Structural and Multidisciplinary Optimization (WCSMO)

The ISSMO Biennial World Congress on Structural and Multidisciplinary Optimization (WCSMO-13) will take place in Beijing, China, on 20-24, May, 2019. Planning and organization are being led by Prof. Xu Guo (Dalian University of Technology) and Prof. Hai Huang (Beihang University), who are serving as Co-Chairs of the Local Organizing Committee. Honorary Chairs are Prof. Gengdong Cheng (ISSMO President), Yoon-Young Kim (ASSMO President, ISSMO Vice President), Prof. Gang Li (ASSMO Co-President), and Prof. Hideyuki Azegami (ASSMO Co-President).

Up-to-date information may be found at www.wcsmo13.org.

2. ISSMO endorsed the following international scientific meetings during 2018:

- ACSMO 2018 – Asian Congress of Structural and Multidisciplinary Optimization, Dalian, China, 21-24 May, 2018. http://www.acsmo2018.org
- AIAA/ISSMO MAO 2018 - The 19th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Atlanta, GA, USA 25-29 June, 2018. https://aviation.aiaa.org/MAO
- DAC/IDETC 2018 – The 44th Design Automation Conference of the International Design Engineering Technical Conference, Quebec City, Canada, 26-29 August, 2018.
- EngOpt 2018 – 6th International Conference on Engineering Optimization, Lisbon, Portugal, 17-20 September, 2018. http://engopt2018.tecnico.ulisboa.pt

- IUTAM 2018 Symposium – When Topology Optimization Meets Additive Manufacturing: Theory and Methods, Dalian, China, 9-12 October, 2018. http://www.iutam2018.org

3. To date, ISSMO has endorsed the following international scientific meetings to be held in 2019:

- AIAA/ISSMO MAO 2019 - The 20th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Atlanta, GA, USA 25-29 June, 2019. https://aviation.aiaa.org/CallforPapers/#Multidisciplinary_Design_Optimization
- DAC/IDETC 2019 – The 45th Design Automation Conference of the International Design Engineering Technical Conference, Anaheim, CA, USA, 18-21 August, 2019.
- OPTARCH2019 - Optimization Driven Architectural Design, Amman, Jordan, 5-7 November, 2019.

Please consult the website www.issmo.net for more information about ISSMO.

Report composed by James K. Guest and Gengdong Cheng

LACCOTAM (Latin American & Caribbean Congress of Theoretical and Applied Mechanics)

No report has been submitted by LACCOTAM.

WCB (World Council of Biomechanics)
https://wc-biomechanics.org

The objective of the World Council of Biomechanics is to provide permanence and stability for the periodic meetings of the World Congress of Biomechanics every 4 years, and to communicate information about the World Congress and any associated satellite meetings, as well as about the scientific priorities in Biomechanics, to as many people interested in the subject as possible. The World Council of Biomechanics has the responsibility for selection of future meeting sites. The World Council also sponsors specialty meetings especially in countries in which biomechanics is an evolving discipline.

Activities of the Council in 2018 include

World Congress of Biomechanics Coordination

The Council works with local organizing committees to facilitate the four-yearly World Congress on Biomechanics. In 2018, the Council was primarily involved with the 8th World Congress of Biomechanics, which was held in Dublin in 2018. The Council oversaw the selection of the hosting for the 9th World Congress of Biomechanics, to be held in Taipei, in 2022.

Eighth World Congress of Biomechanics
8 - 12 July 2018 | Dublin, Ireland

The 8th WCB brought together more than 4000 engineers and scientists from more than 70 countries from disciplines including biology, physics, mathematics, computer science, chemistry and various clinical specialities. The meeting was an overwhelming success, and here were 372 keynote talks, more than 1800 podium and 2000 poster presentations. The Council provided €25000 worth of travel awards for students and junior academics to attend the conference.

Planning for Ninth World Congress of Biomechanics
July 2022 | Taipei

At its general assembly meeting in 2018, the Council selected a bid led by Professors Fong-Chin Su and Tung-Wu Lu, to hold the next WCB in Taipei in 2022. The Council met with the organizers during WCB 2018 in Dublin to provide advice and input.

Travel Awards Prizes and Fellowships

For more details see https://www.wc-biomechanics.org

Report composed by Lynne Bilston

Reports on ISC and its Scientific Committees

ISC (International Science Council)
https://council.science/

International Science Council Founding General Assembly
Paris, France, 3-5 July 2018

The International Science Council (ISC) is the new organization formed from the merger of ICSU (International Council for Science) and ISSC (International Social Science Council), which was decided in Taipei, Taiwan, on 23-26 October, 2017. ISC is a non-governmental organization with a membership of more than 180 organizations, including scientific unions and associations, national scientific bodies, and affiliated members. ISC held its inaugural General Assembly on 3-4 July, 2018, which was attended by Nadine Aubry, IUTAM President. The two-day meeting, hosted by the French Académie des Sciences and held in the historical building of the Maison des Oceans in Paris, was chaired by Gordon McBean, President of the International Council for Science (ICSU) and Alberto Martinelli, President of the International Social Science Council (ISSC) until the election of the Incoming ISC President took place. After the election, Daya Reddy, Incoming ISC President, chaired the meeting. The meeting was well attended with 421 participants.

3 July. The first day was dedicated to a membership meeting, with the agenda consisting of a) an overview of the key achievements since the 2017 meeting in Taipei, b) discussions on potential new initiatives for ISC to consider, c) a briefing from the Elections Committee to prepare the membership for the important elections of the new President and Governing Board to take place the next day, and d) time for networking and side meetings.

Key achievements since last October consisted mostly of the implementation of the merger, but administrative meetings and ongoing core activities continued as well.

"The vision of the International Science Council (ISC) is to advance science as a global public good with a mission to act as the global voice for science." Within that context, discussions on ideas of new initiatives first took place in two breakout groups; Group 1 comprising the scientific unions and associations and Group 2 consisting of member organizations. Moderators of each group reported back to the plenary session. While Group 1 reported on mobility and migration, wellbeing, complexity, science of the brain, gender parity, molecular genetics, and universality of science, Group 2 reported on scientific publishing, artificial intelligence and machine learning, indigenous and local knowledge, mental health, science education, and sustainable urban living, with other potential issues worth consideration such as the Earth, science

entrepreneurship, gender balance in science, cultural heritage, the use of ISC's Agenda 2030 and Sustainable Development Goals to ensure added value of individual projects, protection of scientists, science communication (particularly fake science), and science ethics. While the plenary discussion highlighted many of the above issues as crucial and timely matters, it also emphasized the need to further define focused ISC activities within the overarching framework of Agenda 2030, with the ultimate goal of turning outcomes of the ISC activities into United Nations policies.

A presentation was made on a possible digital platform for further membership engagement in between General Assemblies and other meetings. The digital tool introduced, "Upform", would allow delegates to access information on ISC as well as collaborate more easily.

Gordon McBean, co-chair of the Elections Committee, presented the Committee's report. He thanked all the members for the large number of nominations and reported that the final list included 74 candidates for 13 slots, with at least five social scientists (1/3 of the slots) to be elected. He praised the large number of nominations, particularly as ISC seeks to increase its gender, geographical, and disciplinary diversity.

The rest of the meeting was spent on networking and side meetings.

4 July. The founding General Assembly of ISC took place on the second day. Alberto Martinelli opened the GA by inviting Catherine Bréchignac, Permanent Secretary of the French Académie des Sciences and former ICSU President, to make introductory remarks. Catherine Bréchignac praised the creation of ISC as she stated the importance of collaboration among the natural and social sciences to address today's most challenging issues. Gordon McBean welcomed all participants, recognizing Walter Munk, one of the most prominent oceanographers and geophysicists, and H.S.H. Albert II, Sovereign Prince of Monaco, who were present. H.S.H. Albert II delivered an address around the importance of both the voice of science and the universality of science, referring to a quote from Louis Pasteur "La science n'a pas de patrie, parce que le savoir est le patrimoine de l'humanité, le flambeau qui éclaire le monde," which translates to "Science has no homeland, because knowledge is the heritage of humanity, the torch that illuminates the world."

Four members of the Resolutions Committee and three tellers were proposed by the Executive Boards of ICSU and ISSC, and subsequently appointed by the General Assembly.

The budgets of ICSU and ISSC were approved electronically at the electronic GA held this past May. The new ISC Board, together with the ISC Finance Committee, would develop the new budget for ISC.

Gordon McBean delivered the report on behalf of the Elections Committee, which had already been discussed the day before. All of the 20 candidates for the ISC Officer positions were invited to give a 3-minute statement and elections took place. It is a pleasure to report that our colleague, Daya Reddy, a mechanician from South Africa, was elected as President. Others elected were Peter Gluckman from New Zealand (President-Elect), Elisa Reis from Brazil (Vice President), Jinghai Li from China (Vice President), Alik Ismail-Zadeh from Russia (Secretary), and Renée van Kessel from the Netherlands (Treasurer).

Candidates for Ordinary Members were then invited to make a 90-second statement and the following scientists were elected: G. Boulton (UK), M.B. Burkins (USA), S. Cooper (South Africa), A. Davies (Ireland), P. Dykstra (the Netherlands), S. Fernando (Sri Lanka), R. Fincher (Australia), J.C. Liao (China-Taipei), N. Tarasova (Russia), and M. Visbeck (Germany).

Incoming President Daya Reddy delivered his incoming presidential address. He reminded everyone of the global challenges facing humanity and the crucial role that science plays to address them. He expressed his support for the established outstanding programmes such as CROP (the Comparative Research Programme on Poverty) and WCRP (the World Climate Research Programme) that ISC should continue and further build on. He also emphasized the necessity of building capacity in developing regions of the world, the importance of (existing and new) collaborations with other science organizations and United Nations agencies, and the need for engaging young scientists. In addition, he stressed his desire to have ISC define and focus on long-term, rather than short-term, projects in order to maximize its impact. He also stated that fundraising efforts were going to be important for the new Council.

There were two bids for holding the next ISC General Assembly in 2021, one from Canada and one from Oman. Representatives from these two countries made presentations and answered questions. The GA elected Oman as the location of the second ISC General Assembly.

The Resolutions Committee presented its report. First, it invited the ISC Governing Board to give priority to two topics: i) The International Year of Basic Science for Development in 2020, ii) The promotion and facilitation of gender equality among world scientists. Second, it presented a formal resolution, which was adopted

regarding the ISC membership of the two organizations: i) China Association for Science and Technology and ii) China: Academy of Sciences in Taipei.

Incoming President Daya Reddy closed the meeting.

A cocktail reception and concert were held at the Académie des Sciences, Palais de l'Institut de France.

5 July. The third day consisted of a public launch event of the new Council, ISC, with keynote addresses and roundtable discussions.

Opening remarks were provided by Sébastian Candel, President of the French Academy of Sciences; Daya Reddy, Incoming President of ISC; Audrey Azoulay, UNESCO Director General; Thierry Coulhon, Advisor to the President of France on Education, Higher education, Research and Innovation; and Frédérique Vidal, Minister for Higher education, Research and Innovation.

Keynote speakers were:

Cedric Villani, French Academy of Sciences and Member of Parliament, who presented on "A voice for science in the contemporary world"

Esther Duflo, Professor of Economics at MIT, and Ismail Serageldin, Emeritus Librarian of the Library of Alexandria, who both made comments on "Advancing science as a global public good"

A reception followed at the National Museum of Natural History.

Respectfully submitted by Nadine Aubry, President of IUTAM

CODATA (Committee on Data)
http://www.codata.org/

First contact:
End of 2018 Francisco Chinesta (as IUTAM representative) initiated discussions with Dr. Simon Hodson (CODATA representative at the Data Committee of the International Science Council).

The context:

Different possibilities were considered around the use of data in the large domain of engineering, and more particularly in mechanics. From the discussions we agreed that in sciences and engineering the hybrid paradigm, enabling for a physics / data alliance could be a real major opportunity.

Thus, data is expected enriching models (based on physics and manipulated from the tools of the mathematical physics, applied mathematics and computer sciences) when they become inaccurate or fail to make fast and accurate enough predictions, compulsory in real-time decision-making.

At the same time data is nowadays visualized, analyzed, classified and transformed into knowledge (modelling) by using the tools of artificial intelligence, and more concretely machine learning. However, these tools were proposed and widely applied in other disciplines where models were less present and reliable. In mechanics models are abundant and in most of cases quite accurate.

Thus, a new "engineered (or physically informed) artificial intelligence" seems compulsory and should be pushed forward.

Moreover, physics-based models allow transforming big-data into a smart-data paradigm, where now, the type of data to be collected, the locations to place sensors and the time instant to collect the data, enable to proceed in the so-called "low-data limit", by simplifying (and reducing the cost) of data-acquisition and data-assimilation.

The alliance of the most accurate physics-based models solved when possible under the stringent real-time constraint, and a real-time learning on-the-fly capabilities, able to proceed in the low-data limit, is opening unimaginable possibilities around the digital-twins, major protagonists of the incipient industry4.0 or even the human-centric industry5.0, by accompanying materials, structures, processes or complex systems during their life or activity.

Past & future actions:

- Construction of the framework and explore the needs at both levels: academia and industry;
- For advancing in that direction and better understand the context, Francisco Chinesta organized two workshops beginning 2019, the first under the auspices of the French Association of Mechanics (AFM) with the representatives of all the AFM scientific groups while involving also the AFM industrial committee. The second workshop (in March 2019) included many other industries and some key researchers from different countries;

- It is expected to organize a meeting in Paris before the summer break (2019) with the CODATA representative, for discussing the synthesis of the previous points and define the possibility of enlarging the spectrum of CODATA actions to include the ones affecting mechanics and engineering, at present nor explicitly considered.

Report composed by Francisco Chinesta

COSPAR (Committee on Space Research)
https://cosparhq.cnes.fr/

The Committee on Space Research (COSPAR) was established by the International Council for Science (ICSU) in 1958. The Purpose of COSPAR is "to promote at an international level scientific research in space, with emphasis on the exchange of results, information, and opinions, and to provide a forum, open to all scientists, for the discussion of problems that may affect scientific space research. The objectives of COSPAR are to be achieved through the organization of scientific assemblies, publications, or any other means." The 42nd COSPAR Scientific Assembly (COSPAR-2018) was held in Pasadena, California, USA from July 14-22, 2018. The California Institute of Technology (Caltech) and the Jet Propulsion Laboratory (JPL) hosted the successful assembly in the Pasadena Convention Center. The scientific program contained nearly 4,000 abstracts in 131 events featured in 341 half-day sessions with almost 3,000 oral presentations and more than 1,000 posters. More than 3,200 people participated in the assembly including scientists, students, exhibitors, sponsors, volunteers, staff and members of the press. The assembly marked the 60th anniversary of COSPAR and was celebrated with a movie. The scientific program was outstanding and featured superb interdisciplinary and public lectures. The elections for officers of the COSPAR also took place during assembly. The assembly provided the opportunity to start planning for the 43rd Scientific Assembly (COSPAR-2020), which will be held in Sydney, Australia during August 15-23, 2020. The COSPAR council has selected Athens, Greece to host the COSPAR-2022 and is expected to be held July 16-24, 2022.

Report composed by Guruswami Ravichandran

SCOR (Scientific Committee on Oceanic Research)
https://scor-int.org/

Report will be provided when an IUTAM representative has been appointed.

Statutes

Statuts de l'Union Internationale de Mécanique Théorique et Appliquée

I «L'Union Internationale de Mécanique Théorique et Appliquée» ci-après dénommée «l'Union» est une organisation scientifique à la fois internationale et non-gouvernementale.

II* Les principaux objectifs de l'Union sont

a) de constituer un lien entre les personnes et les organisations engagées dans le travail scientifique dans toutes les branches de la mécanique théorique et appliquée, par des recherches analytiques, numériques et expérimentales;

b) d'organiser les congrès internationaux de mécanique théorique et appliquée par l'intermédiaire de son Comité permanent des Congrès (cf. Art. XIII ci-après), et d'organiser d'autres réunions internationales sur des sujets relevant de la mécanique théorique et appliquée;

c) de s'engager en d'autres activités visant à promouvoir le développement de la mécanique, aussi bien théorique qu'appliquée, en tant que branche de la science.

*) *Article II adopté par l'Assemblée Générale de l'Union, le 18 août 2004 à Varsovie, Pologne*

III L'autorité suprême de l'Union est son Assemblée Générale.

Cette Assemblée détient le pouvoir de décider sur toute question affectant l'Union, notamment sur toute modification de ses Statuts. Sur des questions spécifiées, elle peut déléguer tout ou partie de ses pouvoirs à un ou à des organismes appropriés.

La composition de l'Assemblée Générale est régie par l'article VI ci-après. Les réunions de l'Assemblée Générale doivent se tenir aux dates fixées par le Bureau de l'Union (cf. Art. XI ci-après) ou sur la demande de 10 Membres au moins de cette Assemblée.

IV Dans toutes ses décisions, l'Assemblée Générale doit être guidée par la tradition de libre coopération scientifique internationale développée par les Congrès Internationaux de Mécanique Théorique et Appliquée. En poursuivant ses objectifs, l'Union respectera le principe général de non-discrimination et reconnaîtra le droit pour tout scientifique, partout dans le monde, d'adhérer ou de s'associer à une activité scientifique internationale sans rencontrer d'opposition pour motif de race, de religion, de philosophie politique, d'origine ethnique, de citoyenneté, de langage ou de sexe.

V** Dans les votes de l'Assemblée Générale, chaque membre ne dispose que d'une voix. Pour une modification des Statuts, la majorité requise est de deux tiers des votes exprimés. Pour toute autre décision la majorité simple des votes exprimés est requise. Tout membre se trouvant dans l'impossibilité d'être présent à une réunion peut désigner, à l'avance et par lettre ou messagerie électronique adressée au Secrétaire Général, un autre membre qu'il charge de voter en son nom.

Dans l'intervalle entre réunions de l'Assemblée Générale, un vote peut être émis par correspondance ou par des moyens électroniques sur proposition formulée par le Bureau (cf. Art. XII ci-après). En pareil cas, le résultat du vote n'est valablement obtenu que si le nombre des participants effectifs n'est pas inférieur aux deux tiers du nombre total des membres de l'Assemblée Générale.

**) *Article V adopté par l'Assemblée Générale de l'Union, le 24 juillet 2018 à Boston, États-Unis*

VI*** L'Assemblée Générale se compose des membres suivants avec droit de vote:

a) des représentants des «organisations adhérentes» (cf. art. VIII);
b) des membres du Bureau (cf. art. XII);
c) des membres cooptés par l'Assemblée Générale de l'Union;
d) le Secrétaire du Comité de Congrès (cf. art. XIII c);
e) les présidents des «Symposia Panels» Fluides et Solides nommés par le Bureau.

La durée de mandat d'un membre coopté est précisée, lors de son élection, par l'Assemblée Générale. La durée de mandat des membres du Bureau coïncide avec celle de leur appartenance au Bureau.

Les catégories suivantes d'observateurs sont invitées à participer, sans droit de vote, à l'Assemblée Générale de l'Union:

i) des représentants des «organisations affiliées» (cf. art. XI);
ii) les présidents des «Working Parties»;
iii) des représentants des « organisations associées adhérentes » (cf. art. IX)
iv) des représentants des pays candidats à l'adhésion;
v) s'il y a lieu, et sur décision de l'Assemblée Générale, des représentants de comités ou groupes de scientifiques.

***) *Article VI adopté par l'Assemblée Générale de l'Union, le 19 août 2014 à Lyngby, Danemark*

VII L'Assemblée Générale doit veiller à une représentation adéquate de tout groupe de scientifiques poursuivant des recherches en mécanique théorique ou appliquée et non représenté par une organisation adhérente.

VIII Les organisations de scientifiques en mécanique théorique ou appliquée (ou les unions de telles organisations) qui représentent effectivement une activité scientifique indépendante dans un pays ou dans un territoire bien défini peuvent être admises dans l'Union par l'Assemblée Générale comme «organisations adhérentes» pourvu que leur dénomination exclue tout malentendu quant à la qualification du pays ou du territoire en cause.

En principe, une seule organisation pourra être admise pour chaque pays ou chaque territoire.

IX**** Des organisations de scientifiques en mécanique théorique ou appliquée qui représentent une activité scientifique indépendante dans un pays ou dans un territoire du monde en voie de développement et qui ne sont pas déjà représentées par des « organisations adhérentes » de l'Union peuvent, avec le soutien écrit d'une « organisation adhérente », être admises en tant qu' « organisations associées adhérentes » de l'Union. La dénomination de l'organisation adhérente proposée doit être sans ambiguïté et politiquement neutre afin d'exclure tout malentendu quant à la qualification du pays ou du territoire qui est représenté.

****) *Article IX adopté par l'Assemblée Générale de l'Union, le 27 août 2008 à Adélaide, Australie*

X***** Chaque «organisation adhérente» dispose d'un certain nombre de représentants dans l'Assemblée Générale et doit acquitter une cotisation annuelle à l'Union (cf. Art. XV ci-après). Chaque « organisation associée adhérente » dispose d'un représentant dans l'Assemblée Générale de l'Union sous la forme d'un observateur sans droit de vote, et doit acquitter une seule cotisation tous les quatre ans (cf. Art. XVI ci-après).

*****) *Article X adopté par l'Assemblée Générale de l'Union, le 27 août 2008 à Adélaide, Australie*

XI Des organisations internationales dont les domaines principaux d'activité sont en étroite relation avec ceux de l'Union peuvent être admises par l'Assemblée Générale en qualité «d'organisations affiliées» à l'Union.

Chaque organisation affiliée a la faculté de désigner un observateur qui est invité à participer, sans droit de vote, à l'Assemblée Générale de l'Union. Le Bureau de l'Union (Article XII) a réciproquement la faculté de désigner un observateur, sans droit de vote, à l'organe ayant une responsabilité équivalente dans l'organisation affiliée.

L'organisation affiliée et l'Union sont tenues de s'informer mutuellement de toutes leurs activités importantes et des mesures affectant leur fonctionnement.

En préparant les rencontres scientifiques internationales qu'elles organisent, l'Union et chaque organisation affiliée sont tenues de prendre soigneusement en considération toutes les décisions déjà prises par l'Union et les organisations affiliées de manière à assurer la bonne coordination de toutes ces activités scientifiques.

Les organisations affiliées n'ont à payer aucune cotisation annuelle à l'Union.

XII****** Pour exécuter les décisions de l'Assemblée Générale et pour assurer entre ses sessions le travail de l'Union, l'Assemblée Générale élit les membres d'un Bureau pour une durée de quatre ans au plus. Le Bureau est composé d'un Comité Directeur (un Président, le précédent Président qui remplit la fonction de Vice-Président, un Secrétaire Général et un Trésorier) et de quatre autres personnes. Les candidats aux sept postes doivent avoir été membres de l'Assemblée Générale à un moment de la période précédant de six ans le moment de l'élection du Bureau.

Les membres, qui ne sont pas au Comité Directeur, ne peuvent recevoir plus de deux mandats consécutifs. Les membres du Bureau nouvellement élus entrent en fonction au 1er novembre qui suit l'Assemblée Générale qui a procédé à leur élection.

Le Bureau doit se réunir au moins une fois par an. Tout membre du Bureau empêché de prendre part à une réunion de celui-ci peut désigner, par lettre adressée au Secrétaire Général, un autre membre de l'Assemblée Générale pour le remplacer.

C'est au Secrétaire Général que doivent être adressées toutes les questions concernant le fonctionnement de l'Union y compris ses relations avec les organisations adhérentes, affiliées ou autres.

Le domicile légal de l'Union se situe au domicile du Secrétaire Général.

Le Bureau a le droit de désigner un trésorier-assistant en tout pays où l'Union est titulaire d'un compte bancaire. Les trésoriers-assistants doivent être choisis parmi les membres de l'Assemblée Générale, mais non nécessairement parmi les membres du Bureau.

Le Bureau doit établir un budget prévisionnel pour l'année à venir, administrer les finances de l'Union et soumettre, chaque année, à l'Assemblée Générale un rapport financier.

Le Vice-Président doit normalement remplir les fonctions du Président pendant toute période où celui-ci se trouve empêché de les exercer.

Entre les réunions de l'Assemblée Générale, il incombe au Bureau de désigner un remplaçant temporaire pour remplir les fonctions du Vice-Président, du Secrétaire Général ou du Trésorier si cela s'avère nécessaire.

******) *Article XII adopté par l'Assemblée Générale de l'Union, le 19 août 2014 à Lyngby, Danemark*

XIII******* L'Assemblée Générale désigne un Comité permanent des Congrès (dorénavant noté CC) chargé d'organiser à intervalles réguliers les Congrès Internationaux de Mécanique Théorique et Appliquée (ICTAM).

a) Le Président de l'Union préside aussi le CC.

b) Le CC nomme un Secrétaire parmi ses membres, sous entendu que cette personne soit d'accord pour être nommée. A partir de la recommandation du CC, l'Assemblée Générale élit le Secrétaire pour un mandat de quatre ans, renouvelable une fois. Il est souhaitable que le Secrétaire ait été membre du CC pour au moins quatre ans avant d'être nommé.

c) Les Membres du CC sont élus par l'Assemblée Générale; ce sont des scientifiques actifs en mécanique théorique ou appliquée, n'appartenant pas nécessairement à l'Assemblée Générale. Avant une Assemblée Générale, le Secrétaire du CC sollicite des nominations des membres du CC, de l'Assemblée Générale, des organisations adhérentes et des organisations affiliées, et des autres sous-comités tels que les « Symposia Panels » et les « Working Parties ». La taille du CC ne doit pas dépasser un tiers de la taille de l'Assemblée Générale. Les mandats des membres du CC sont limités, sauf cas particuliers, à deux mandats successifs.

   Il est souhaitable que la composition du CC soit représentative des différentes branches des sciences mécaniques ainsi que de la diversité de la communauté des sciences mécaniques.

d) Le CC nomme un Comité Exécutif parmi ses membres. Le Président de l'IUTAM et le Secrétaire du CC jouent automatiquement les rôles respectifs de Président et de Secrétaire du comité exécutif. Quatre membres supplémentaires sont nommés. Le President du Congrès International de Mécanique Théorique et Appliquée à venir peut également être nommé au sein du comité exécutif « ex officio ». L'un des prérequis pour être nommé au sein du comité exécutif est d'avoir une solide expérience de grands congrès. A partir des nominations effectuées par le CC, l'Assemblée Générale élit le comité exécutif du CC. Les mandats des membres supplémentaires du comité exécutif CC sont limités à deux mandats successifs.

e) Les règles de fonctionnement du CC sont soumises à l'approbation de l'Assemblée Générale.

*******) *Article XIII adopté par l'Assemblée Générale de l'Union, le 19 août 2014 à Lyngby, Danemark*

XIV******** Les ressources financières de l'Union sont constituées par:

a) les cotisations annuelles des «organisations adhérentes»;
b) les cotisations des « organisations associées adhérentes » ;
c) les dons et subventions que l'Union peut recevoir.

L'Union doit tenir une liste de ses bienfaiteurs où doivent être mentionnés pour chaque année les noms des personnes ou institutions qui ont accordé à l'Union des dons, des legs ou des subventions.

********) *Article XIV adopté par l'Assemblée Générale de l'Union, le 27 août 2008 à Adélaide, Australie*

XV Le nombre des représentants d'une «organisation adhérente» et le montant de la cotisation annuelle qu'elle doit acquitter sont définis dans le tableau suivant, par la catégorie à laquelle elle désire appartenir, et avec l'accord de l'Assemblée Générale.

Catégorie	Nombre de représentants	Nombre d'unités de la cotisation annuelle
I	1	1
II	2	3
III	3	5
IV	4	8
V	5	12

Le montant de l'unité de cotisation annuelle est fixé par l'Assemblée Générale, au moins une année précédente celle à laquelle cette cotisation devient exigible.

XVI********* La cotisation d'une « organisation associée adhérente » est établie pour couvrir une période de quatre ans, et le montant de ce paiement unique est égal à la cotisation annuelle de l'année en cours d'une « organisation adhérente » de catégorie I. L'admission en tant qu'« organisation associée adhérente » devient effective dès réception de cette cotisation par le Trésorier. Le statut de chaque « organisation associée adhérente » est réexaminé après les quatre premières années, ainsi qu'après les quatre années suivantes. La catégorie de Membre Associé est normalement limitée à un maximum de huit ans. La possibilité de demander l'admission en tant que Membre de la Catégorie I est offerte à tout moment à un Membre Associé.

*********) *Article XVI adopté par l'Assemblée Générale de l'Union, le 27 Août 2008 à Adélaide, Australie.*

XVII********** Toute proposition de modification des Statuts, présentée ou par le Bureau ou par le Secrétaire Général, et ayant reçu l'appui d'au moins dix membres de

l'Assemblée Générale ayant le droit de vote, devra être envoyée aux membres de l'Assemblée Générale avec l'ordre du jour de la réunion de l'Assemblée Générale. Le débat sur de telles propositions devra s'effectuer au cours de la première session et le vote au cours de la seconde (Article V).

**********) *Article XVII adopté par l'Assemblée Générale de l'Union, le 28 Août 1994 à Amsterdam, Pays-Bas.*

Règles de fonctionnement du Comité des Congrès de l'Union*

1. Le Comité des Congrès se réunit à chaque fois que l'Assemblée Générale se réunit. Typiquement, cela veut dire tous les deux ans, à l'occasion de l'Assemblée Générale entre congrès et à l'occasion du Congrès International.

2. Pendant un Congrès International, le CC passe en revue les propositions pour le Congrès International suivant et sélectionne le lieu par un vote des membres du CC présents (les votes par procuration ne sont pas autorisés). Ce processus de sélection se déroule au cours de deux réunions distinctes du CC.

3. Le Comité Exécutif est chargé de prendre au nom du CC toutes les décisions nécessaires pendant la période qui s'écoule entre deux réunions successives, et de lui en faire rapport à sa prochaine réunion. Le Secrétaire doit rester en contact avec tous les membres du CC et les solliciter lorsqu'il y a des questions importantes à traiter.

4. L'organisation effective d'un Congrès est confiée à un Président et à un Secrétaire-Général du Congrès, identifiés par l'organisation qui invite. Le Président et le Secrétaire-Général du Congrès sont responsables de tous les aspects du succès du Congrès, et en particulier de la publication des Comptes rendus du Congrès. Le Président et le Secrétaire-Général du Congrès maintiendront un dialogue constant avec le Comité Exécutif, feront un rapport annuel au Comité Exécutif et un rapport au CC à chaque réunion du CC, depuis le moment où le lieu a été choisi jusqu'à ce que le Congrès ait eu lieu.

5. Le Président et le Secrétaire-Général du Congrès devront obtenir l'approbation du CC (normalement par l'intermédiaire du Comité Exécutif) pour toutes les questions relevant de la politique générale du CC, en particulier pour celles qui concernent:
   - 5.1. le but du Congrès;
   - 5.2. la sélection des communications pour le Congrès;
   - 5.3. le choix des conférences générales pour le Congrès;
   - 5.4. la désignation des présidents de sessions du Congrès;
   - 5.5. les principes généraux régissant les arrangements financiers du Congrès.

6. Les organisateurs percevront, de tous les membres du congrès, une contribution afin de couvrir les dépenses administratives du CC. Ces contributions seront reversées à

l'IUTAM immédiatement après le congrès. Le montant de ces contributions restera du même ordre de grandeur de congrès à congrès.

*) *Procédure adoptée par l'Assemblée Générale de l'Union, le 19 Août 2014 à Lyngby, Danemark*

Règles pour l'élection du Bureau de l'IUTAM*

1. Lors de l'Assemblée Générale (AG) précédant celle au cours de laquelle le nouveau Bureau doit être élu, un Comité Electoral (CE) doit être élu comprenant le Président de IUTAM (qui assure la présidence de ce Comité) et deux à quatre membres de l'AG, non-membres du Bureau en exercice.

2. A la suite de cette élection, le CE invite les membres avec droit de vote et observateurs de l'AG, spécifiés dans l'Article VI des Statuts sous les rubriques a), b), c), i) et ii), à faire connaître à son Président, dans des délais fixés, leurs suggestions de candidatures pour le Bureau, c'est-à-dire pour les charges de Président (P), de Secrétaire Général (S), de Trésorier (T) et pour quatre autres postes. Toutes ces suggestions doivent être traitées confidentiellement par le CE.

3. Prenant en compte toutes les suggestions reçues, le CE doit soumettre au Secrétaire Général les noms proposés comme candidats au Bureau: un seul nom pour les charges P,S,T et un ou plusieurs noms pour chacun des quatre autres postes (W,X,Y,Z). Le CE doit s'assurer que tous les candidats ainsi proposés sont prêts à accepter leur élection. Toutes ces propositions sont portées par le Secrétaire Général à la connaissance des membres de l'AG avant la première session de l'AG au cours de laquelle le nouveau Bureau doit être élu.

4. Lors de cette première session d'autres propositions de candidatures peuvent être proposées pour chacun des postes P, S, T, W, X, Y, Z. Aucun candidat ne peut être proposé pour plus d'un seul poste.

5. Avant la seconde session de l'AG au cours de laquelle le nouveau Bureau doit être élu, chaque proposition envisagée au point 4 ci dessus pour pouvoir être acceptée doit recevoir l'appui d'au moins dix membres de l'AG ayant le doit de vote au moyen d'une déclaration écrite et signée et faire l'objet d'un engagement écrit de la personne proposée indiquant qu'elle est prête à accepter son élection. Toute proposition ne remplissant pas ces conditions sera retirée.

6. Pour chacun des postes P, S, T, W, X, Y, S, l'AG est appelé à désigner le titulaire par un vote mettant en compétition les candidats restants. S'il y a plusieurs candidats pour un poste, le vote doit avoir lieu au scrutin secret.

*) *Procédure adoptée par l'Assemblée Générale de l'Union, le 18 Août 2004 à Varsovie, Pologne*

Règles pour l'élection de Membres Cooptés par l'Assemblée Générale*

1. La procédure s'applique à l'élection et à la réélection des membres cooptés par l'Assemblée Générale mentionnés à l'article VI c) des Statuts.

2. Les propositions émanant des membres de l'Assemblée Générale ayant le droit de vote en vue de l'élection des membres cooptés, doivent parvenir au Bureau au moins trois mois avant l'Assemblée Générale au cours de laquelle ces propositions sont prises par elle en considération, en règle générale celle qui se tient pendant le Congrès International de Mécanique Théorique et Appliquée. Toutes ces propositions doivent être traitées confidentiellement par le Bureau.

3. Après avoir pris en compte toutes les propositions ainsi reçues le Bureau présente à l'Assemblée Générale une liste de celles qui sont jugées pouvoir recevoir de la part de l'Assemblée Générale un soutien raisonnable, pourvu cependant que le nombre total des membres cooptés n'excède pas 1/8 environ du nombre total des membres ayant le droit de vote. La liste de ces propositions est communiquée à tous les membres de l'Assemblée Générale pendant la première session de la réunion de l´Assemblée au cours de laquelle doit avoir lieu le vote.

4. Une liste de propositions différente de celle présentée par le Bureau n'est recevable que si elle a recueilli le soutien d'au moins dix membres de l'Assemblée Générale avant la seconde session.

5. L´Assemblée Générale vote sur les listes de candidats qui font l'objet des paragraphes 3 et 4.

*) *Procédure adoptée par l'Assemblée Générale de l'Union, le 26 Août 1992 à Haïfa, Israël*

Statutes of the International Union of Theoretical and Applied Mechanics

I. "The International Union of Theoretical and Applied Mechanics" hereinafter called "the Union" is an international non-governmental scientific organization.

II.* The principal objectives of the Union are

a) to form a link between persons and organizations engaged in scientific work in all branches of theoretical and applied mechanics and related sciences, including analytical, computational and experimental investigations;

b) to organize international congresses of theoretical and applied mechanics through a standing Congress Committee (Article XII), and to organize other international meetings for subjects falling within the field of theoretical and applied mechanics;

c) to engage in other activities meant to promote development of mechanics, both theoretical and applied, as a branch of science.

*) *Article II adopted by the General Assembly on August 18, 2004, in Warsaw, Poland*

III. The highest authority of the Union is its General Assembly.

The General Assembly has the power to decide all questions affecting the Union, including alterations of the Statutes. On specified questions it may delegate its power to appropriate bodies.

The composition of the General Assembly is regulated in Article VI. Meeting of the General Assembly will take place at times decided by the Bureau (Article XII) or on the request of at least 10 members of the General Assembly.

IV. In all its decisions the General Assembly shall be guided by the tradition of free international scientific cooperation, developed in the International Congresses for Theoretical and Applied Mechanics. In pursuing its objectives the Union shall observe the basic policy of non-discrimination and affirm the rights of scientists throughout the world to adhere to or to associate with international scientific activity without regard to race, religion, political philosophy, ethnic origin, citizenship, language or sex.

V.** In voting every member of the General Assembly shall dispose of one vote. For an alteration of the Statutes the majority required is 2/3 of the votes brought forward. For all other decisions a simple majority of the votes brought forward is required. Any member who is unable to attend a meeting may by a letter or notification via

electronic mail to the Secretary General constitute another member of the General Assembly as proxy.

Between meetings of the General Assembly voting may be carried out by correspondence or by electronic means upon proposals made by the Bureau (Article XII); in this case decisions will be valid only provided the number of persons taking part in the vote is not less than 2/3 of the total membership of the General Assembly.

**) *Article V adopted by the General Assembly on July 24, 2018, in Boston, USA*

VI.*** The General Assembly is composed of

a) representatives of the adhering organizations (Article VIII);
b) members of the Bureau (Article XII);
c) members-at-large;
d) the Secretary of the Congress Committee (Article XIII c);
e) the Chairs of the Fluids and Solids Symposia panels appointed by the Bureau.

The term of a member-at-large shall be determined by the General Assembly at the time of the election. The term of members of the Bureau shall coincide with their term of service on the Bureau.

The following categories of observers are invited to take part in the General Assembly without voting rights:

i) representatives of affiliated organizations (Article XI);
ii) chairmen of the Working Parties;
iii) representatives of adhering associated organisations (Article IX);
iv) representatives of countries applying for membership;
v) representatives of committees and groups of scientists, if so decided by the General Assembly.

***) *Article VI adopted by the General Assembly on August 19, 2014, in Lyngby (Denmark)*

VII. The General Assembly shall provide for an adequate representation of any group of scientists carrying out research in theoretical or applied mechanics and not represented by an adhering organization.

VIII. Organizations of scientists in theoretical or applied mechanics (or unions of such organizations) which effectively represent independent scientific activity in a country or in a definite territory can be admitted by the General Assembly as adhering organizations of the Union provided they can be listed under a name that will avoid any misunderstanding about the country or territory represented.

In general only one organization from each country or territory will be admitted.

IX.**** Organisations of scientists in theoretical or applied mechanics which represent independent scientific activity in a country or territory of the developing world and which are not already represented by an adhering organisation of the Union may, with the written support of one adhering organisation, be admitted as an adhering associate organisation of the Union. The name of the proposed adhering organisation must be unambiguous and politically neutral in order to avoid misunderstanding about the country or territory being represented.

****) *Article IX adopted by the General Assembly on August 27, 2008, in Adelaide (Australia)*

X.***** Each adhering organization shall have representatives in the General Assembly of the Union, and pay an annual subscription to the Union in accordance with Article XV. Each adhering associate organisation shall have one representative as a nonvoting observer in the General Assembly of the Union, and shall pay a single subscription once for each four-year period in accordance with Article XVI.

*****) *Article X adopted by the General Assembly on August 27, 2008, in Adelaide (Australia)*

XI. International organizations mainly occupied in fields closely related to that of the Union can be admitted by the General Assembly as affiliated organizations of the Union.

Each affiliated organization has the right to appoint an observer, who is invited to take part in the General Assembly without voting rights. The Bureau of the Union (Article X) has the reciprocal right to appoint a nonvoting observer to the corresponding council or other executive body of the affiliated organization.

The affiliated organization and the Union are mutually obliged to keep each other informed about all important activities of and organizational measures taken.

In organizing international scientific meetings the Union and each of the affiliated organizations are obliged to consider carefully all measures already taken by the Union and its affiliated organizations in order to coordinate such international scientific activities.

Affiliated organizations pay no annual dues to the Union.

XII.****** To execute the decisions of the General Assembly and to carry out work between meetings, the General Assembly elects members of a Bureau for a period of at most four years. The Bureau consists of the officers (President, the retiring President who serves as Vice-President, Secretary-General, and Treasurer) and four

other persons. The candidates for all seven positions must have been full, voting members of the General Assembly at some time within the six years preceding the time of election to the Bureau.

The maximum continuous period of service as a member of the Bureau, other than an officer, is limited to eight years. Newly elected members of the Bureau enter into office on the date of November 1, following the General Assembly at which they are elected.

The Bureau will meet at least every year. A member of the Bureau who is prevented from attending a meeting may by letter to the Secretary-General designate another member of the General Assembly as a replacement.

The Secretary-General will act as a permanent center for all matters affecting the Union, including relations with adhering, affiliated and other organizations.

The legal domicile of the Union shall be the place where the Secretary-General lives.

The Bureau is authorized to appoint Assistant-Treasurers in those countries where the Union has a bank account.

The Assistant-Treasurers must be members of the General Assembly but need not to be members of the Bureau.

The Bureau shall draft a budget for each coming year, and shall administer the finances. The Bureau shall submit an annual financial report to the General Assembly.

The Vice-President shall normally fulfill the duties of the President should the President become unable to discharge them.

Between meetings of the General Assembly the Bureau shall decide who shall undertake the duties of the Vice President, Secretary-General, or Treasurer should a temporary replacement be necessary.

******) *Article XII adopted by the General Assembly on August 19, 2014, in Lyngby (Denmark)*

XIII.******* The General Assembly establishes a standing Congress Committee (henceforth abbreviated CC) which is responsible for the organization of International Congresses of Theoretical and Applied Mechanics at regular intervals.

a) The President of the Union shall also serve as chair of the CC.

b) The CC shall nominate a Secretary from its membership subject to that person's willingness to be nominated. Based on the CC nomination, the General Assembly elects the Secretary of the CC for a four-year term with the possibility of renewal for a second term. It is desirable that the Secretary should have been a member of the CC for at least four years prior to nomination.

c) Members of the CC are elected by the General Assembly as individuals active in theoretical and applied mechanics and need not be members of the General Assembly. Prior to a General Assembly, the Secretary of the CC shall invite nominations from members of the CC, the General Assembly, Adhering and Affiliated Organizations, and any appropriate subcommittees, such as the Symposia Panels and Working Parties. The size of the CC shall not exceed one-third the size of the General Assembly. Terms of service as a member of the CC shall generally be limited to two, successive four-year terms.
It is desired that the composition of the CC be representative of the various mechanics disciplines, and of the diversity of the mechanics community.

d) The CC shall nominate an Executive Committee from its membership. The President of IUTAM and the Secretary of the CC automatically serve as Chair and Secretary of the Executive Committee, respectively. Four additional members shall be nominated. The President of the upcoming International Congress may also be appointed to the Executive Committee ex officio. Experience with large congresses is a desirable quality of nominees for the Executive Committee. Based on the CC nominations, the General Assembly elects the Executive Committee of the CC. Terms of service of the additional members on the Executive Committee of the CC are generally limited to two four-year terms.

e) The rules of procedure of the CC shall be approved by the General Assembly.

*******) *Article XIII adopted by the General Assembly on August 19, 2014, in Lyngby (Denmark)*

XIV.******** The financial means of the Union are formed by:

a) the annual subscriptions of the adhering organizations;
b) the subscriptions of the adhering associate organisations;
c) gifts and grants.

The Union shall maintain a roll of benefactors on which shall be inscribed annually the names of those persons or institutions which have accorded gifts, legacies or other subventions to the Union.

********) *Article XIV adopted by the General Assembly on August 27, 2008, in Adelaide (Australia)*

XV. The number of representatives of an adhering organization and the amount of the annual subscription to be paid by that organization will be regulated according to one of the following categories, as proposed by the adhering organization and after approval of the General Assembly of the Union:

Category	Number of representatives	Units of annual subscription
I	1	1
II	2	3
III	3	5
IV	4	8
V	5	12

Changes in the amount of the unit annual subscription will be decided by the General Assembly not less than one year in advance.

XVI.********* The subscription of an associate adhering organisation shall be set to cover a four-year period, and the level of this single payment shall be equal to the current annual subscription of a Category I adhering organisation. Admission as an associate adhering organisation shall be conditional on receipt of this subscription by the Treasurer. The status of each adhering associate organisation shall be reviewed after the initial four years and again after a further four years. Associate Membership shall normally be limited to a maximum of eight years. The option to apply for Category I Membership shall be open to an Associate Member at any time.

*********) *Article XVI adopted by the General Assembly on August 27, 2008, in Adelaide (Australia)*

XVII.********** Any proposal for alteration of the Statutes either prepared by the Bureau or supported by statements to the General-Secretary signed by at least ten voting members of the General Assembly with voting rights, shall be sent to members of the General Assembly with the Agenda for a meeting of the General Assembly. Such proposals shall be discussed during the first session of that meeting and voted upon during the second session (Article V).

**********) *Article XV adopted by the General Assembly on August 28, 1994, in Amsterdam, Netherlands*

Rules of procedure for the Congress Committee (CC) of IUTAM*

1. The CC shall hold meetings whenever the General Assembly meets. Typically, this is every two years, during the General Assembly meeting between congresses and during the International Congress.

2. During an International Congress, the CC shall review proposals for the next International Congress and select the location by a vote of the CC members present

(i.e., proxy votes are not permitted). This selection process will typically be accomplished over two separate meetings of the CC.

3. The Executive Committee handles matters arising on behalf of the CC during the period between General Assemblies. At each General Assembly the Secretary of the CC reports on all such matters and their disposition since the last General Assembly. The Secretary should stay in close contact with the full membership of the CC and solicit input on substantive issues.

4. The actual organization of a Congress is delegated to a President and Secretary-General of the Congress, identified by the host. The President and the Secretary-General of the Congress are responsible to IUTAM for all aspects of the successful conduct of the Congress, including the publication of its Proceedings. The President and the Secretary-General of the Congress shall maintain an ongoing dialog with the Executive Committee, and shall make an annual report on progress to the Executive Committee, and a report to the full committee at every meeting of the CC, from the time the congress location is selected until the congress has been held.

5. The President and the Secretary-General of the Congress shall obtain the approval of the CC (often through the Executive Committee) with regard to all matters affecting the general policy of the CC, and in particular with regard to:
   - 5.1. the scope of the Congress;
   - 5.2. the screening of papers for the Congress;
   - 5.3. the selection of general lectures for the Congress;
   - 5.4. the appointment of chairs of sessions of the Congress;
   - 5.5. the broad principles regarding financial arrangements for the Congress.

6. Following the congress, the host will pay a fee to IUTAM equivalent to a percentage of the registration fee paid by all attendees. The Executive Committee will ascertain that the level of the fee is consistent from congress to congress.

*) *Procedure adopted by the General Assembly on August 19, 2014, in Lyngby, Denmark*

Procedure for election of the Bureau of IUTAM*

1. At the General Assembly (GA) preceding the one at which the new Bureau is to be elected, an Electoral Committee (EC) shall be elected, consisting of the President of IUTAM (who shall act as Chairman of the EC) and two to four members of the GA who are not members of the current Bureau.

2. Following its election, the EC shall invite from those voting members and observers of the GA indicated under a), b), c), i) and ii) in Article VI of the Statutes, within a specified time limit, suggestions for candidates for the Bureau, viz.
for the Offices of President (P), Secretary-General (S) and Treasurer (T), and for the four non-Officer positions. All suggestions shall be treated confidentially by the EC.

3. Taking account of all suggestions received, the EC shall submit to the Secretary-General nominations for candidates for election to the Bureau: one name for each of the Officer positions (P, S, T) and one or more names for each of the non-Officer positions (W, X, Y, Z). The EC will make sure that the candidates thus nominated are willing to accept an election. These nominations shall be conveyed by the Secretary-General to the GA in advance of the first session of the meeting of the GA at which the new Bureau is to be elected.

4. At this first session, additional candidates may be proposed by members of the GA for each and any of the positions P, S, T, W, X, Y, Z. No candidate may be proposed for more than one position.

5. Before the second session of the GA at which the new Bureau is to be elected, the proposals under clause 4 above shall be accepted if supported by statements to the Secretary-General each signed by at least ten (voting) members of the GA and by written confirmation that each nominee is willing to accept election; otherwise they shall be considered withdrawn.

6. The GA shall vote separately on the surviving nominations for each of the positions P, S, T, W, X, Y, Z. In any case in which there is more than one candidate for a position, the vote shall be by secret ballot.

*) *Procedure adopted by the General Assembly on August 18, 2004, in Warsaw, Poland*

Procedure for electing Members-at-Large of the General Assembly*

1. This procedure shall apply for the election and re-election of the Members-at-Large of the General Assembly (GA) provided for in Article VI(c) of the Statutes.

2. Proposals, by members of the GA with voting rights, for Members-at-Large must be received by the Bureau at least three months before the meeting of the GA at which proposals are to be considered, normally during the International Congresses of Theoretical and Applied Mechanics (ICTAM). All proposals will be treated confidentially by the Bureau.

3. Taking into account all material received, the Bureau will present to the GA such proposals as it deems will have at least a reasonable support by the GA, provided however that the total number of Members-at-Large is not to exceed approximately one eighth (1/8) of the total GA membership with voting rights. Such proposals will be circulated to all members of the GA during the first session of meeting of the Assembly at which the proposals are to be voted on.

4. Proposals not identical with those presented by the Bureau are considered to be withdrawn, unless they are sustained and supported by at least ten members of the GA before its second session.

5. The GA will vote on those candidates mentioned in the proposals of §3 and §4.

*) *Procedure adopted by the General Assembly on August 26, 1992, in Haifa, Israel*

List of Publications

Five categories of IUTAM publications can be distinguished:

a) Annual Reports
Since 1948, the Union has published a Report every year with detailed information on its activities. Since 2013, all these Annual Reports are available as pdf files on the IUTAM website.

b) Newsletters
At the meeting of the Bureau of IUTAM held in Warsaw in August 2001 it was agreed that the IUTAM Newsletter should be revived.

A primary purpose of the Newsletter, in conjunction with the IUTAM website, is to provide information concerning future activities of IUTAM, particularly its Symposia and Summer Schools, and concerning the International Congress of Theoretical and Applied Mechanics (ICTAM).

The Newsletter will also serve to keep members of IUTAM informed about any other current developments of concern to IUTAM. The IUTAM Newsletters are available from the IUTAM website.

c) Proceedings of IUTAM Symposia
Since 2018, the recommended form of publication of proceedings of IUTAM Symposia is the IUTAM Bookseries by Springer. The website of the series is
https://www.springer.com/series/7695

From 2011 to 2017, the official publisher for proceedings of IUTAM Symposia was Elsevier, under the Procedia IUTAM series. Procedia IUTAM is open access. All proceedings are freely available on the website of Procedia IUTAM
http://www.journals.elsevier.com/procedia-iutam

d) Proceedings of the International Congresses on Theoretical and Applied Mechanics (ICTAM)
Until 2008, they were only available by direct ordering from the publisher.

The Proceedings of ICTAM 2012 have been published under the Procedia IUTAM series. The link is www.sciencedirect.com/science/journal/22109838/10.

The Proceedings of ICTAM 2016 have been published under the Procedia IUTAM series. The link is www.sciencedirect.com/science/journal/22109838/20. All two-page abstracts of papers presented at ICTAM 2016 have been published by IUTAM and are available at www.iutam.org/publications/ictam-proceedings/ictam_2016.

e) Publications on the history of IUTAM
See page 195

Proceedings of IUTAM Symposia

The Proceedings of IUTAM Symposia published since 2010 are listed below.
A complete listing of all published Proceedings can be found at the IUTAM website http://www.iutam.org.

2010

10-1 *IUTAM Symposium on Computational Aero-Acoustics for Aircraft Noise Prediction* (Southampton, UK, March 29 – 31, 2010).
The Proceedings of the Symposium edited by Astley, Jeremy and Gabard, Gwenael have been published by Elsevier, 2011, as the first issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 1

10-2 *IUTAM Symposium on Nonlinear Stochastic Dynamics and Control* (Hangzhou, China, May 10-14, 2010).
The Proceedings of the Symposium edited by Zhu, W.Q., Lin, Y.K. and Cai, G. Q. have been published by Springer, 2011. ISBN 978-94-007-0731-3

10-3 *IUTAM Symposium on Dynamics Modeling and Interaction Control in Virtual and Real Environments* (Budapest, Hungary, June 7-11, 2010).
The Proceedings of the Symposium edited by Stépán, Gábor, Kovács, László L. and Tóth, András have been published by Springer, 2010.
ISBN 978-94-007-1642-1

10-4 *IUTAM Symposium on Bluff Body Wakes and Vortex-Induced Vibrations* (Capri, Italy, June 22-25, 2010).
The Proceedings of the Symposium edited by Leweke, Thomas and Williamson, Charles, have been published by Elsevier, as a special issue of the Journal of Fluids and Structures, Volume 27, Issues 5-6, Pages 637-884, July-August 2011.

10-5 *IUTAM Symposium on Nonlinear Dynamics for Advanced Technologies and Engineering Design (NDATED)* (Aberdeen, UK, July 27-30, 2010).
The Proceedings of the Symposium edited by Marian Wiercigroch and Giuseppe Rega have been published by Springer, 2013. ISBN 978-94-007-5742-4

10-6 *IUTAM Symposium on Surface Effects in the Mechanics of Nanomaterials and Heterostructures* (Beijing, China, August 8-12, 2010).
The Proceedings of the Symposium edited by Cocks, Alan and Wang, Jianxiang, have been published by Springer, 2012. ISBN 978-94-007-4910-8

10-7 *IUTAM Symposium on Human Movement Analysis and Simulation* (Leuven, Belgium, September 13-15, 2010).

The Proceedings of the Symposium edited by Jonkers, Ilse and Vander Sloten, Jos, have been published online, 2010, www.mech.kuleuven.be/iutam2010/IUTAM_proceedings/index.html. ISBN 978-94-6018-247-1

2011

11-1 *IUTAM Symposium on Mechanics of Liquid and Solid Foams* (Austin, USA, May 8-13, 2011).
The Proceedings of the Symposium edited by Kyriakides, Stelios and Kraynik, Andrew, have been published by Elsevier, as a special issue of the International Journal of Solids and Structures, 2012, and of the Journal of Rheology, Volume 56, Issue 3, Pages i-665, May 2012.

11-2 *IUTAM Symposium on Linking Scales in Computations: From Microstructure to Macro-scale Properties* (Pensacola, USA, May 17-19, 2011).
The Proceedings of the Symposium edited by Cazacu, Oana, have been published by Elsevier, 2012, as the third issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 3

11-3 *IUTAM Symposium on Human Body Dynamics* (Waterloo, Canada, June 5-8, 2011).
The Proceedings of the Symposium edited by McPhee, John and Kovecses, Jozsef, have been published by Elsevier, 2011, as the second issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 2

11-4 *IUTAM Symposium on Full-field Measurements and Identification in Solid Mechanics* (Cachan, France, July 4-8, 2011).
The Proceedings of the Symposium edited by Hild, F. and Espinosa, H.D., have been published by Elsevier, 2011, as the fourth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 4

11-5 *IUTAM Symposium on Impact Biomechanics in Sport* (Dublin, Ireland, July 7-9, 2011).
The Proceedings of the Symposium edited by Michael Gilchrist and Manuel Forero Rueda have been published as a special issue of the Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology, Volume 226, No 3-4, 2012.

11-6 *IUTAM Symposium on Computer Models in Biomechanics* (Stanford University, USA, August 29 – September 02, 2011)
The Proceedings of the Symposium edited by Holzapfel, Gerhard A. and Kuhl, Ellen have been published by Springer, 2013. ISBN 978-94-007-5464-5

11-7 *IUTAM Symposium on 50 Years of Chaos: Applied and Theoretical* (Kyoto, Japan, November 28 – December 2, 2011).
The Proceedings of the Symposium edited by Hikihara, Takashi have been published by Elsevier, 2012, as the fifth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 5

11-8 *IUTAM Symposium on Bluff Body Flows*
(Kanpur, India, December 12-16, 2011).
The Proceedings of the Symposium edited by Mittal, Sanjay and Biswas, Gautam have been published as a special issue of the Journal of Fluids and Structures, Volume 41, Pages 1-186, August 2013.

2012

12-1 *IUTAM Symposium on Mobile Particulate Systems: Kinematics, Rheology and Complex Phenomena* (Bangalore, India, January 23-27, 2012).
The Proceedings of the Symposium edited by P.R. Nott, R.H. Davis, M. Reeks, D. Saintillan and S. Sundaresan have been published as a special issue of Physics of Fluids, Volume 25, Issue 7, July 2013.

12-2 *IUTAM Symposium on Advanced Materials Modelling for Structures*
(Paris, France, April 23-27, 2012).
The Proceedings of the Symposium edited by Altenbach, Holm and Kruch, Serge have been published by Springer, 2013. ISBN 978-3-642-35167-9

12-3 *IUTAM Symposium on From Mechanical to Biological Systems: an Integrated Approach* (Izhsvesk, Russia, June 5-10, 2012).
The Proceedings of the Symposium edited by V.V. Kozlov and A.V. Borisov have been published as a special issue of Regular and Chaotic Dynamics, Volume 18, No. 1-2, 2013.

12-4 *IUTAM Symposium on Waves in Fluids: Effects of Nonlinearity, Rotation, Stratification and Dissipation* (Moscow, Russia, June 18-22, 2012).
The Proceedings of the Symposium edited by Y. Chashechkin and D. Dritschel have been published by Elsevier, 2013, as the eighth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 8

12-5 *IUTAM Symposium on Multiscale Problems in Stochastic Mechanics*
(Karlsruhe, Germany, June 25-28, 2012).
The Proceedings of the Symposium edited by C. Proppe and J.-M. Bourinet have been published by Elsevier, 2013, as the sixth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 6

12-6 *IUTAM Symposium on Fracture Phenomena in Nature and Technology*
(Brescia, Italy, July 1-5, 2012).

The Proceedings of the Symposium edited by D. Bigoni, A. Carini, M. Gei and A. Salvadori have been published as a Special Issue of the International Journal of Fracture, Volume 184, Issues 1-2, November 2013, and by Springer, 2014. ISBN 978-3-319-04396-8

12-7 *IUTAM Symposium on Understanding Common Aspects of Extreme Events in Fluids* (Dublin, Ireland, July 2-6, 2012).
The Proceedings of the Symposium edited by M. Bustamante, A.C. Newell, R.M. Kerr and M. Tsubota have been published by Elsevier, 2013, as the ninth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 9

12-8 *IUTAM Symposium on Topological Fluid Dynamics: Theory and Applications* (Cambridge, UK, July 23-27, 2012).
The Proceedings of the Symposium edited by H.K. Moffatt, K. Bajer and Y. Kimura have been published by Elsevier, 2013, as the seventh issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 7

12-10 *IUTAM Symposium on Particle Methods in Fluid Mechanics* (Lyngby, Denmark, October 15-17, 2012).
The Proceedings of the Symposium edited by J.H. Walther have been published by Elsevier, 2016, in the IUTAM e-Procedia series.
Procedia IUTAM Volume 18

2013

13-1 *IUTAM Symposium on Vortex Dynamics: Formation, Structure and Function* (Fukuoka, Japan, March 10-14, 2013).
The Proceedings of the Symposium edited by Y. Fukumoto have been published as a special issue of Fluid Dynamics Research, Volume 46, No. 3, 2014.

13-2 *IUTAM Symposium on Nonlinear Interfacial Wave Phenomena from the micro- to the macro-scale* (Limassol, Cyprus, April 14-18, 2013).
The Proceedings of the Symposium edited by Papageorgiou D.T., Smyrlis, Y.S., Vanden-Broeck J.-M. and Christodoulides, P. have been published by Elsevier, 2014, as the eleventh issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 11

13-3 *IUTAM Symposium on Recent Development of Experimental Techniques under Impact Loading* (Xi'an, China, May 6-10, 2013).
The Proceedings of the Symposium edited by Yulong Li and Han Zhao have been published as a special issue of the International Journal of Impact Engineering, Volume 79, 2015.

13-4 *IUTAM Symposium on Materials and Interfaces under High Strain Rate and Large Deformation* (Metz, France, June 17-21, 2013).
The Proceedings of the Symposium edited by S. Mercier, J.F. Molinari and D. Rittel have been published as a special issue of Mechanics of Materials, Volume 80, Part B, pp 163-374, 2015.

13-5 *IUTAM Symposium on Multiscale Modeling and Uncertainty Quantification of Materials and Structures* (Santorini Island, Greece, September 9-11, 2013).
The Proceedings of the Symposium edited by M. Papadrakakis and G. Stefanou have been published by Springer, 2014. ISBN 978-3-319-06330-0

13-6 *IUTAM Symposium on the Dynamics of Extreme Events Influenced by Climate Change* (Lanzhou, China, September 23-25, 2013).
The Proceedings of the Symposium edited by N. Huang have been published by Elsevier, 2016, as the seventeenth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 17

2014

14-1 *IUTAM Symposium on Transition and Turbulence in the Flow through Deformable Tubes and Channels* (Bangalore, India, January 20-24, 2014).
The Proceedings of the Symposium edited by Shankar, V. and Kumaran, V. have been published as a special issue of Sadhana, Volume 40, Issue 3, May 2015.

14-2 *IUTAM Symposium on Mechanics of Soft Active Materials*
(Haifa, Israel, May 12-15, 2014).
The Proceedings of the Symposium edited by Volokh, K. and Jabareen, M. have been published by Elsevier, 2015, as the 12th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 12

14-3 *IUTAM Symposium on Connecting Multiscale Mechanics to Complex Material Design* (Evanston, USA, May 13-16, 2014).
The Proceedings of the Symposium edited by Liu, W.K., Fish, J., Chen, J.S. and Camanho, P.P. have been published as a special issue of Computational Mechanics, Volume 57, Issue 3, March 2016.

14-4 *IUTAM Symposium on Micromechanics of Defects in Solids*
(Seville, Spain, June 9-13, 2014).
The Proceedings of the Symposium edited by Ariza, P., Ortiz, M. and Tvergaard, V. have been published as a special issue of Mechanics of Materials, Volume 90, Pages 1-268, November 2015.

14-5 *IUTAM Symposium on Dynamical Analysis of Multibody Systems with Design Uncertainties* (Stuttgart, Germany, June 9-13, 2014).

The Proceedings of the Symposium edited by Hanss, M. have been published by Elsevier, 2015, as the 13th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 13

14-7 *IUTAM Symposium on Dynamics of Capsules, Vesicles and Cells in Flow* (Compiegne, France, July 15-18, 2014).
The Proceedings of the Symposium edited by Barthès-Biesel, D., Blyth, M.G. and Salsac, A.-V. have been published by Elsevier, 2015, as the 16th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 16

14-8 *IUTAM Symposium on Innovative Numerical Approaches for Multi-Field and Multi-Scale Problems* (Burg Schnellenberg, Germany, September 1-4, 2014).
The Proceedings of the Symposium edited by Weinberg, K. and Pandolfi, A. have been published in the Lecture Notes in Applied and Computational Mechanics series by Springer, 2016. ISBN 978-3-319-39021-5

14-9 *IUTAM Symposium on Complexity of Nonlinear Waves*
(Tallinn, Estonia, September 8-12, 2014).
The Proceedings of the Symposium edited by Salupere, A. and Maugin, G.A. have been published as a special issue of the Proceedings of the Estonian Academy of Sciences, Volume 64, Issue 3S, 2015.

14-10 *IUTAM Symposium on Multiphase Flows with Phase Change: Challenges and Opportunities* (Hyderabad, India, December 8-11, 2014).
The Proceedings of the Symposium edited by Sahu, K.C. have been published by Elsevier, 2015, as the 15th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 15

14-11 *IUTAM Symposium on Advances in Computation, Modeling and Control of Transitional and Turbulent Flows* (Goa, India, December 15-18, 2014).
The Proceedings of the Symposium edited by Sengupta, T.K, Lele, S.K., Sreenivasan, K.R. and Davidson, P.A. have been published by World Scientific, 2016. ISBN 978-981-4635-15-8

IUTAM-ABCM Symposium on Laminar Turbulent Transition
(Rio de Janeiro, Brazil, September 8-12, 2014).
The Proceedings of the Symposium edited by Medeiros, M.A.F. and Meneghini, J.R. have been published by Elsevier, 2015, as the 14th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 14

2015

15-2 *IUTAM Symposium on Ductile Failure and Localization*
(Paris, France, March 17-20, 2015).

The Proceedings of the Symposium edited by Mohr, D. and Ravi-Chandar, K. have been published as a special issue of the International Journal of Fracture, Volume 200, Issue 1-2, 2016.

15-3 *IUTAM Symposium on Growing Solids*
(Moscow, Russia, June 23-27, 2015).
The Proceedings of the Symposium edited by Manzhirov, A.V., Altenbach, H., and Gupta, N. have been published by Elsevier, 2017, as the 23rd issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 23

15-4 *IUTAM Symposium on Analytical Methods in Nonlinear Dynamics*
(Frankfurt, Germany, June 6-9, 2015).
The Proceedings of the Symposium edited by Hagedorn, P. and Clerkin, E. have been published by Elsevier, 2016, as the 19th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 19

2016

16-1 *IUTAM Symposium on Filling Gaps in Material Property Space*
(Cambridge, UK, March 14-16, 2016).
The Proceedings of the Symposium edited by Deshpande, V.S. and Fleck, N.A. have been published as a special issue of Extreme Mechanics Letters, Volume 10, Pages 1-78, 2017.

16-2 *IUTAM Symposium on Mechanics of Stretchable Electronics*
(Hangzhou, China, March 17-18, 2016).
A report on the Symposium by Song, J. has been published in Journal of Applied Mechanics, Volume 83, 128001, 2016.

16-3 *IUTAM Symposium on Helicity, Structures and Singularity in Fluid and Plasma Dynamics* (Venice, Italy, April 11-15, 2016).
The Proceedings of the Symposium edited by Fukumoto, Y., Ricca, R.L., Boyland, P., and Eggers, J. have been published as a special issue of Fluid Dynamics Research, Volume 50, Issue 1, 2018.

16-4 *IUTAM Symposium on Advances in Biomechanics of Hearing*
(Stuttgart, Germany, May 17-20, 2016).
The Proceedings of the Symposium edited by Ziegler, P. have been published by Elsevier, 2017, as the 24th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 24

16-5 *IUTAM Symposium on Dynamic Instabilities in Solids*
(Madrid, Spain, May 17-20, 2016).

The Proceedings of the Symposium edited by Rittel, D. and Rodriguez-Martinez, J.A. have been published as a special issue of Mechanics of Materials, Volume 116, 2018.

16-6 *IUTAM Symposium on Nanoscale Physical Mechanics*
(Nanjing, China, May 23-27, 2016).
The Proceedings of the Symposium edited by Guo, W. have been published by Elsevier, 2017, as the 21st issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 21

16-7 *IUTAM Symposium on Integrated Computational Structure-Material Modeling of Deformation and Failure under Extreme Conditions*
(Baltimore, USA, June 20-22, 2016).
The Proceedings of the Symposium edited by Ghosh, S. and Bronkhorst, C.A. have been published as a special issue of Computational Mechanics, Volume 61, Issue 1-2, 2018, and as a special issue of the International Journal of Fracture, Volume 208, Issue 1-2, 2017.

16-8 *IUTAM Symposium on Jet Noise Modelling and Control*
(Palaiseau, France, September 28-30, 2016).
The Proceedings of the Symposium edited by Lesshafft, L., Jordan, P. and Agarwal, A. have been published as a special issue of Comptes Rendus Mécanique, Volume 346, Issue 10, 2018.

16-9 *IUTAM Symposium on Storm Surge Modelling and Forecasting*
(Shanghai, China, October 17-20, 2016).
The Proceedings of the Symposium edited by Liu, H. and Dias, F. have been published by Elsevier, 2017, as the 25th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 25

16-10 *IUTAM Symposium on Nonlinear and Delayed Dynamics of Mechatronic Systems* (Nanjing, China, October 17-21, 2016).
The Proceedings of the Symposium edited by Wang, Z., Insperger, T., and Zhang, L. have been published by Elsevier, 2017, as the 22nd issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 22

2017

17-3 *IUTAM Symposium on Multi-Scale Fatigue, Fracture and Damage of Materials in Harsh Environments*
(Galway, Ireland, August 28 – September 1, 2017).
The Proceedings of the Symposium edited by Leen, S., O'Donoghue, P. and Barrett, R. have been published as a special issue of the International Journal of Fatigue, October 2018.

17-4 *IUTAM Symposium on Wind Waves*
(London, UK, September 4-8, 2017).
The Proceedings of the Symposium edited by Grimshaw, R., Hunt, J., and Johnson, E. have been published by Elsevier, 2018, as the 26th issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 26

17-5 *IUTAM Symposium on Intelligent Multibody Systems – Dynamics, Control, Simulation* (Sozopol, Bulgaria, September 11-15, 2017).
The Proceedings of the Symposium edited by Zahariev, E.V. and Cuadrado, J. have been published by Springer, 2019, as Volume 33 of the IUTAM Bookseries. ISBN 978-3-030-00527-6

17-6 *IUTAM Symposium on Co-Simulation and Solver Coupling – Recent Developments in Theory and Application*
(Darmstadt, Germany, September 18-20, 2017).
The Proceedings of the Symposium edited by Schweizer, B. have been published by Springer, 2019, as Volume 35 of the IUTAM Bookseries. ISBN 978-3-030-14883-6

2018

18-1 *IUTAM Symposium on Recent Advances in Moving Boundary Problems in Mechanics* (Christchurch, New Zealand, February 12-15, 2018).
The Proceedings of the Symposium edited by Gutschmidt, S., Hewett, J.N. and Sellier, M. have been published by Springer, 2019, as Volume 34 of the IUTAM Bookseries. ISBN 978-3-030-13720-5

18-8 *IUTAM Symposium on Mechanical Environments of Living Cells*
(Xi'an, China, June 28-30, 2018).
The Proceedings of the Symposium edited by Xu, F., Lu, T.J., Genin, G.M. and Huang, G. have been published as a special issue of Acta Mechanica Sinica, Volume 35, Issue 2, 2019.

Proceedings of the International Congresses on Theoretical and Applied Mechanics (ICTAM)

Until September 4, 1964 the organization of the International Congresses for Applied Mechanics was supervised by the "International Committee for the Congresses of Applied Mechanics" and for each Congress the organization was separately entrusted to a local Organizing Committee who also undertook the publication of the Proceedings. Consequently, there is no central point from which Proceedings may be ordered, and for each volume, application must be made to the publishers who took care of that particular volume.

Since September 4, 1964 the same task will be fulfilled by the Standing Congress Committee of IUTAM, and local Organizing Committees to be established.

The titles of the volumes and the names of the publishing firms are given below.

1st Congress, Delft (Netherlands), 22-26 April 1924.
Proceedings of the First International Congress for Applied Mechanics, Delft 1924, edited by C.B. Biezeno and J.M. Burgers (one vol.). Technische Boekhandel en Drukkerij J.Waltman Jr. Delft, 1925. No more copies are available for sale at Delft.

2nd Congress, Zürich (Switzerland), 12-17 September 1926.
Verhandlungen - Comptes rendus - Proceedings of the 2nd International Congress for Applied Mechanics, Zürich, 12-17 September 1926, herausgegeben von E. Meissner (one vol.). Orell Füssli Verlag, Zürich und Leipzig, 1927.

3rd Congress, Stockholm (Sweden), 24-29 August 1930.
Verhandlungen - Compte rendus - Proceedings of the 3rd International Congress for Applied Mechanics, herausgegeben von A.C.W. Oseen und W. Weibull (3 vol.). AB. Sveriges Litografiska Tryckerier, Stockholm, 1931.

4th Congress, Cambridge (UK), 3-9 July 1934.
Proceedings of the Fourth International Congress for Applied Mechanics, Cambridge, UK, 3-9 July, 1934 (one vol.). University Press, Cambridge (UK), 1935.

5th Congress, Cambridge (Massachusetts, USA), 12-16 September 1938.
Proceedings of the Fifth International Congress for Applied Mechanics, held at Harvard University and the Massachusetts Institute of Technology, Cambridge, Massachusetts, September 12-16, 1938, edited by J.P. den Hartog and H. Peters (one vol.), John Wiley and Sons, Inc. New York (USA), and Chapman and Hall Ltd. London (UK), 1939.

6th Congress, Paris (France), 22-29 September 1946.
Proceedings not published (were given in the hands of Gauthier-Villars, Paris).

7th Congress, London (UK), 5-11 September 1948.
Proceedings of the Seventh International Congress for Applied Mechanics, 1948, published by the Organizing Committee (Introduction, Vol. I, Vol. II - Parts 1 and 2, Vol. III, Vol. IV).

8th Congress, Istanbul (Turkey), 20-28 August 1952.
Proceedings published by the Organizing Committee (Vol. I, Vol. II). Faculty of Sciences, University of Istanbul, P.O. Box 245, Istanbul (Turkey), 1953.

9th Congress, Brussels (Belgium), 5-13 September 1956.
Proceedings published by the Organizing Committee (Vol. I to Vol. VIII). Free University of Brussels, 50, avenue Franklin-Roosevelt, Brussels (Belgium), 1957.

10th Congress, Stresa (Italy), 31 August-7 September 1960.
Proceedings published by the Consiglio Nazionale delle Ricerche, Piazelle delle Science 7, Roma (Italia), printed by Elsevier Publishing Company, Amsterdam-New York, 1962.

11th International Congress on Theoretical and Applied Mechanics (ICTAM), Munich (Germany), 30 August-5 September 1964.
The Proceedings, edited by H. Görtler, have been published by Springer-Verlag, Heidelberger Platz 3, Berlin (Germany), 1966.

12th International Congress on Theoretical and Applied Mechanics (ICTAM), Stanford, Cal. (USA), 26-31 August 1968.
The Proceedings, edited by M. Hetényi and W.G. Vincenti, have been published by Springer-Verlag, Berlin (Germany), 1969.

13th International Congress on Theoretical and Applied Mechanics (ICTAM), Moscow (USSR), 21-26 August 1972.
The Proceedings, edited by E. Becker and G.K. Mikhailov, have been published by Springer-Verlag, Berlin (Germany), 1973.

14th International Congress on Theoretical and Applied Mechanics (ICTAM), Delft (Netherlands), 30 August-4 September 1976.
The Proceedings, edited by W.T. Koiter, have been published by North-Holland Publishing Company, Amsterdam-New York-Oxford, 1976, 1977.

15th International Congress on Theoretical and Applied Mechanics (ICTAM), Toronto (Canada), 17-23 August 1980
The Proceedings, edited by F.P.J. Rimrott and B. Tabarrok, have been published by North-Holland Publishing Company, Amsterdam-New York-Oxford 1980.

16th International Congress on Theoretical and Applied Mechanics (ICTAM),
Lyngby (Denmark), 19-25 August 1984.
The Proceedings, edited by F.I. Niordson and N. Olhoff, have been published by Elsevier Science Publishers (North-Holland), Amsterdam, 1985.

17th International Congress on Theoretical and Applied Mechanics (ICTAM),
Grenoble (France), 21-27 August 1988.
The Proceedings, edited by P. Germain, M. Piau and D. Caillerie, have been published by North-Holland, Elsevier Science Publishers, Amsterdam, 1989. ISBN 0-444-87302-3

18th International Congress on Theoretical and Applied Mechanics (ICTAM),
Haifa (Israel), 22-28 August 1992.
The Proceedings, edited by S.R. Bodner, J. Singer, A. Solan and Z. Hashin, have been published by Elsevier Science Publishers, Amsterdam, 1993. ISBN 0-444-88889-6

19th International Congress on Theoretical and Applied Mechanics (ICTAM),
Kyoto (Japan), 25-31 August 1996.
The Proceedings, edited by T. Tatsumi, E. Watanabe, T. Kambe, have been published by Elsevier Science Publishers, Amsterdam, 1997. ISBN 0-444-82446-4

20th International Congress on Theoretical and Applied Mechanics (ICTAM),
Chicago (USA), 27 August-2 September 2000.
The Proceedings, entitled “Mechanics for a new Millenium and edited by H. Aref and J.W. Phillips, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7156-9

21st International Congress on Theoretical and Applied Mechanics (ICTAM),
Warsaw (Poland), 15-21 August 2004.
The Proceedings, entitled "Mechanics of the 21st Century" and edited by W. Gutkowski and T.A. Kowalewski, have been published by Springer, Dordrecht, The Netherlands, 2005. ISBN 1-4020-3456-3

22nd International Congress on Theoretical and Applied Mechanics (ICTAM),
Adelaide (Australia), 24-29 August 2008.
The Proceedings, entitled "Mechanics Down Under" and edited by J. Denier and M. Finn, have been published by Springer, Dordrecht, The Netherlands, 2013, both as an eBook (ISBN 978-94-007-5968-8) and as a Hardcover (ISBN 978-94-007-5967-1).

23rd International Congress on Theoretical and Applied Mechanics (ICTAM),
Beijing (China), 19-24 August 2012.
The Proceedings, entitled "Mechanics for the World" and edited by Y. Bai, J. Wang and D. Fang, have been published by Elsevier, 2014, as the tenth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 10

24th International Congress on Theoretical and Applied Mechanics (ICTAM),
Montreal (Canada), 22-26 August 2016.
The Proceedings, entitled "Mechanics – Foundation of Multidisciplinary Research" and edited by J. M. Floryan, have been published by Elsevier, 2017, as the twentieth issue of the IUTAM e-Procedia series. Procedia IUTAM Volume 20

All 2-page papers presented during ICTAM 2016 are collected in the e-book entitled "Contributions to the Foundations of Multidisciplinary Research in Mechanics", edited by J.M. Floryan and published by IUTAM, 2017. The book is available on the IUTAM website. ISBN 978-0-660-05459-9

Publications on the history of IUTAM

IUTAM - A Short History,
edited by S. Juhasz, has been published by Springer- Verlag, Berlin, Germany, 1988. ISBN 978-3-540-50043-8 (Print), 978-3-642-45649-7 (Online).

The short history is dedicated to the memory of Professor Theodore von Karman who had an essential role in the formation of IUTAM. Contributions by S. Juhasz, Sir James Lighthill, G. Battimelli, J. Hult, N.J. Hoff, D.C. Drucker and F.I. Niordson are included in the book.

The second, updated and revised, edition of the book:
IUTAM - A Short History, Second Edition,
edited by P. Eberhard and S. Juhasz, has been published by Springer International Publishing, 2016. ISBN 978-3-319-31061-9 (Print), 978-3-319-31063-3 (Online); DOI: 10.1007/978-3-319-31063-3.

The book is available free of charge at www.springer.com/de/book/9783319310619.

Mechanics at the Turn of the Century,
edited by W. Schiehlen and L. van Wijngaarden, has been published by Shaker Verlag, Aachen, Germany, 2000. ISBN 3-8265-7714-0.

This Report is the result of an initiative of the Bureau of IUTAM to provide some landmarks on the developments in Mechanics during the 20th Century, to report on the 50 years of impulse to Mechanics by the International Union of Theoretical and Applied Mechanics (IUTAM), to visualize by a poster Meters of Motion on the occasion of the 20th International Congress of Theoretical and Applied Mechanics (ICTAM), to look ahead on a very personal basis and to show the broad international involvement of scientists in IUTAM in recent years.

The booklet "Mechanics at the Turn of the Century" is accessible free of charge on the website of Shaker Verlag. The internet address is www.shaker.de and search for Schiehlen as the author. Moreover, this booklet is available upon request at the IUTAM Secretariat.

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