

REPORT 2011

INTERNATIONAL UNION OF THEORETICAL AND
APPLIED MECHANICS

REPORT 2011



Ecole Normale Supérieure de Cachan, France
and
University College Dublin, Ireland

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Bureau: Officers and Members

The following members of the Bureau of IUTAM have been elected for the period 1 November 2008 to 31 October 2012:

Officers

Professor T.J. Pedley (UK)	President
Professor L.B. Freund (USA)	Vice-President
Professor N. Olhoff (Denmark)	Treasurer
Professor F. Dias (France)	Secretary-General

Members

Professor F.L. Chernousko (Russia)	(elected 2008)
Professor N.K. Gupta (India)	(elected 2008)
Professor F. Lund (Chile)	(elected 2010)
Professor A. Thess (Germany)	(elected 2008)

Secretariat

IUTAM-Secretariat, Centre de Mathématiques et de Leurs Applications,
Ecole Normale Supérieure de Cachan, 94235 Cachan, France
Telephone: +33 1 47 40 59 00, Telefax: +33 1 47 40 59 01
E-mail: frederic.dias@cmla.ens-cachan.fr
Internet: <http://www.iutam.net>

Past Officers

<i>Elected</i>	<i>President</i>	<i>Vice-President</i>	<i>Treasurer</i>	<i>Secretary</i>
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)

Past Congress Presidents

<i>Nr.</i>	<i>Year</i>	<i>Place</i>	<i>Congress-President</i>
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

Adhering Organizations

Argentina (1959)

Asociación Argentina de Mecánica Computacional
Güemes 3450, 3000 Santa Fe
President/Chair: Dr. S. R. (Sergio) Idelsohn
Contact: Dr. S. R. (Sergio) Idelsohn
Representatives in IUTAM: Dr. S. R. (Sergio) Idelsohn

Australia (1964)

The Australian National Committee for Mechanical Sciences of the Australian Academy of Sciences
GPO Box 783, Canberra City, ACT 2601
President/Chair: Dr. J.P. (Jim) Denier
Contact: Dr. J.P. (Jim) Denier
Representatives in IUTAM: Dr. J.P. (Jim) Denier, Prof. S. (Scott) Sloan

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. F. (Franz) Rammerstorfer
Contact: Prof. A. (Alfred) Kluwick
Representatives 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. J. (Joris) Degrieck
Contact: Prof. Y. (Yvan) Baudoin
Representatives in IUTAM: Prof. P. (Philippe) Boulanger, Prof. E. (Erik) Dick, Prof. D. (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. V. (Valder) Steffen Jr.
Contact: Prof. L. (Luiz) Bevilacqua, Prof. J.A.P. (José) Aranha
Representatives in IUTAM: Prof. F. (Franca) Arruda, Prof. L. (Luiz) Bevilacqua

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

Representatives in IUTAM: Prof. S. (Stefan) Radev

Canada (1963)

The National Research Council of Canada,

Montreal Road, Ottawa, Canada K1A 0R6

National Committee for IUTAM

President/Chair: Prof. S.B. (Stuart) Savage

Contact: Prof. J.W. (Jean) Zu

Representatives in IUTAM: Prof. J.M. (Maciej) Floryan, Prof. S.B. (Stuart) Savage,

Prof. S. (Suresh) Shrivastava, Prof. J.W. (Jean) Zu

Chile (1996)

The Chile National Committee on Theoretical and Applied Mechanics Academia Chilena de Ciencias

Almirante Montt 454, Santiago, Chile

President/Chair: Dr. F. (Francisco) Rothhammer Engel

Secretary: Dr. T. (Tito) Ureta Aravena

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, Beijing 100190

President/Chair: Prof. H. (Haiyan) Hu

Secretary: Prof. X. (Xiqiao) Feng

Contact: Prof. J.-X. (Jianxiang) Wang

Representatives in IUTAM: Prof. Y. (Yi-long) Bai, Prof. J. (Jiachun) Li, Prof. W. (Wei)

Yang, Prof. Z. (Zhemin) 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 av., Kowloon Tong, HK

President/Chair: Dr. J. (Jane) WZ Lu

Secretary: Dr. Jeff Jianfeng Wang

Contact: Prof. A. (Andrew) Leung

Representatives in IUTAM: Prof. T.X. (Tongxi) Yu

China-Taipei (1980)

The Society of Theoretical and Applied Mechanics

Center for Construction Materials and Technology, National Yunlin University of Science and Technology, Yunlin 64002, Taiwan (R.O.C.)

President/Chair: Prof. W.-C. (Wei-Chung) Yang

Secretary: Prof. C.-H. (Cho-Liang) Tsai

Contact: Prof. C.-C. (Chien-Cheng) Wang

Representatives in IUTAM: Prof. C.-C. (Chien-Ching) Ma, Prof. W.-C. (W-Cheng) Wang

Croatia (1994)

Croatian Society of Mechanics

Ivana Lucica 5, HR-10000 Zagreb .

President/Chair: Prof. F. (Zdravko) Virag

Contact: Prof. G. (Goran) Turkalj

Representatives 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. (Yorgos-Socrates) Smyrlis

Czech Republic (1993/1949)

The National Committee of Theoretical and Applied Mechanics

Academy of Sciences of the Czech Republic, Institute of Thermomechanics,
Dolejšková 5, CZ-18200 Prague 8

President/Chair: Prof. M. (Miloslav) Okrouhlík

Secretary: Dr. J. (Jiri) Naprstek

Contact: Prof. M. (Miloslav) Okrouhlík

Representatives 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. N. (Niels) Olhoff

Representatives in IUTAM: Prof. N. (Niels) Olhoff, 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,
Cairo, Egypt.

President/Chair: Prof. M.K. (Mohamed) Ismail

Secretary General: Prof. Z.Z. Momeh

Contact: Prof. M.K. (Mohamed) Ismail

Representatives 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

Contact: Prof. A. (Andrus) Salupere

Representatives in IUTAM: Prof. A. (Andrus) Salupere

Finland (1952)

The Finnish National Committee on Mechanics

Helsinki University of Technology, Attent. Prof. Rolf Stenberg, P.O.Box 1100, FIN-
02015 TKK, Finland

President/Chair: Prof. J. (Juha) Paavola

Secretary: Prof. R. (Rolf) Stenberg

Contact: Prof. J. (Juha) Paavola

Representatives in IUTAM: Prof. J. (Juha) Paavola, Prof. R. (Rolf) Stenberg

France (1949)

Comité National Français de Mécanique, Académie des Sciences

23, quai Conti, F-75006 Paris

President/Chair: Prof. P. (Pierre) Suquet

Secretary: Prof. F. (Frédéric) Dias

Contact: Prof. A. (Ahmed) Benallal, Prof. F. (François) Charru, Prof. A. (Alain) Molinari

Representatives in IUTAM: Prof. A. (Ahmed) Benallal, Prof. S. (Sébastien) Candel,

Prof. F. (François) Charru, Prof. A. (Alain) Molinari

Georgia (2000)

National Committee of Theoretical and Applied Mechanics

I. Vekua Institute of Applied Mathematics of Tbilisi State University, 2 University Str.,
Tbilisi 0143

President/Chair: Prof. G. (George) Jaiani

Secretary-General: Prof. G. (Gela) Kipiani

Contact: Prof. G. (George) Jaiani

Representatives in IUTAM: Prof. G. (George) Jaiani

Germany (1950)

Deutsches Komitee für Mechanik (DEKOMECH)

Hamburg University of Technology, Institute of Modelling and Computation,
Denickestraße 17, D-21073 Hamburg

President/Chair: Dr. R. Kienzler

Secretary: Prof. O. (Otto) von Estorff

Contact: Prof. P. (Peter) Eberhard

Representatives in IUTAM: Prof. P. (Peter) Eberhard, Dr. R. Kienzler, Prof. M. (Martin)

Oberlack, Prof. A. (André) Thess

Greece (1979)

Hellenic Society for Theoretical and Applied Mechanics

National Technical University of Athens, Mechanics Division, Zographou, GR-15773

President/Chair: Prof. J.T. (John) Katsikadelis

Secretary: Prof. H.G. (Haralambos) Georgiadis

Representatives in IUTAM: Prof. J.T. (John) Katsikadelis

Hungary (1948)

Hungarian National Committee for IUTAM

Department of Structural Mechanics, Budapest University of Technology and
Economics, Műegyetem rkp. 3, H-1521 Budapest

President/Chair: Prof. S. (Sandor) Kaliszky

Secretary: Prof. G. (Gábor) Stépán

Representatives in IUTAM: Prof. S. (Sandor) Kaliszky

India (1950)

National Committee for Theoretical and Applied Mechanics of the Indian National
Science Academy

Bahadur Shah Zafar Marg, New Delhi - 110 002

President/Chair: Prof. D.V. Singh

Contact: Prof. G. (Gautam) Biswas

Representatives in IUTAM: Prof. G. (Gautam) Biswas, Prof. N. (Narinder) Gupta, Prof.

T. (Tarun) Kant, Prof. D. Singh

Ireland (1984)

Irish National Committee for Mathematical Sciences

Royal Irish Academy, 19 Dawson Street, Dublin 2

President/Chair: Prof. R. (Richard) Timoney

Secretary: Prof. R. (Rachel) Quinlan

Contact: Prof. M. (Michael) Gilchrist

Representatives in IUTAM: Prof. M. (Michael) Gilchrist

Israel (1950)

The Israel Society of Theoretical and Applied Mechanics
Faculty of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa
32000
President/Chair: Prof. M.B. (Miles) Rubin
Contact: Prof. Y. (Yosibash) Zohar
Representatives in IUTAM: 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. G. (Giuseppe) Rega
Secretary: Prof. A. (Angelo) Morro
Contact: Prof. P. (Paolo) Podio-Guidugli
Representatives in IUTAM: Prof. G. (Giulio) Maier, Prof. A. (Angelo) Morro,
Prof. P. (Paolo) Podio-Guidugli, 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. T. (Toshio) Kobayashi
Contact: Prof. T. (Tsutomu) Kambe
Representatives in IUTAM: Prof. T. (Toshio) Kobayashi, Prof. K. (Koji) Uetani, Prof. E.
(Eiichi) Watanabe, Prof. T. (Tsutomu) Kambe

Korea, Republic of (1989)

Korean Society of Theoretical and Applied Mechanics
Department of Aerospace Engineering, Seoul National University, Seoul 151-742
President/Chair: Prof. J.Y. (Jung Yul) Yoo
Secretary: Prof. S.J. (Seung Jo) Kim
Contact: Prof. J.Y. (Jung Yul) Yoo
Representatives in IUTAM: Prof. J.Y. (Jung Yul) Yoo

Latvia (1992)

Latvian National Committee for Mechanics
Latvian Academy of Sciences, Akademijas laukums 1, Riga LV-1524
President/Chair: Prof. V. (Vitauts) Tamuzs
Contact: Prof. V. (Vitauts) Tamuzs
Representatives in IUTAM: Prof. V. (Vitauts) Tamuzs

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
Representatives 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. D.H. (Dick) van Campen

Contact: Prof. D.H. (Dick) van Campen, Prof. R (René) de Borst

Representatives in IUTAM: Prof. R (René) de Borst, Prof. D.H. (Dick) van Campen,
Prof. A.A. (Anton) van Steenhoven

New Zealand (1979)

The Royal Society of New Zealand, Committee on Mathematical & Information
Sciences

P.O. Box 598, Wellington

President: Dr N. (Neville) Jordan

Contact: Dr. J. (Jez) Weston

Representatives in IUTAM: Dr. G. (Graham) Weir

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

Representatives in IUTAM: Prof. J. (John) Grue

Poland (1952)

Committee for Mechanics of the Polish Academy of Sciences

ul. Swietokrzyska 21, PL-00 049 Warszawa

President/Chair: Prof. W. (Witold) Gutkowski

Contact: Prof. G. (Gwidon) Szefer

Representatives in IUTAM: Prof. W. (Witold) Gutkowski, Prof. G. (Gwidon) Szefer

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. C.A. (Carlos) Mota Soares

Contact: Prof. C.A.B. (Carlos) Pina, Prof. D.R.Z. (Dinar) Camotim

Representatives 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, Romania
President/Chair: Prof. H. (Horia) Ene
Secretary: Prof. V. (Vasile) Brinzanescu
Representatives 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. G.G. (Gorimir) Chernyi
Secretary: Prof. G.K. (Gleb) Mikhailov
Contact: Prof. F.L. (Felix) Chernousko, Prof. N.F. (Nikita) Morozov
Representatives in IUTAM: Prof. F.L. (Felix) Chernousko, Prof. G.G. (Gorimir) Chernyi, Prof. G.K. (Gleb) Mikhailov, Prof. N.F. (Nikita) Morozov

Saudi Arabia (1988)

King Abdullaziz 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
Representatives 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. S. (Stevan) Maksimovic
Secretary: Prof. B. (Borislav) Gajic
Contact: Prof. T. (Tomislav) Igc
Representatives in IUTAM: Prof. S. (Stevan) Maksimovic

Slovakia (1993)

The Slovak Society for Mechanics
Council of Scientific Societies, Stefánikova 49, SK-811 04 Bratislava
President/Chair: Prof. J. (Jan) Sladek
Contact: Prof. J. (Jan) Sladek
Representatives in IUTAM: Prof. J. (Jan) Sladek

Slovenia (1994)

Slovene Mechanics Society, Faculty of Mechanical Engineering
University of Maribor, Smetanova 17, 2000 Maribor
President/Chair: Prof. L. (Leopold) Skerget
Secretary: Prof. J. (Jure) Marn
Representatives in IUTAM: Prof. L. (Leopold) Skerget

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: Prof. C.G. (Charl) du Toit
Contact: Prof. C.G. (Charl) du Toit
Representatives in IUTAM: Prof. S. (Shalk) Kok

Spain (1950)

Instituto Nacional de Tecnica Aeroespacial
Carretera de Ajalvir km. 4,00, Torrejón de Ardoz, 28850 Madrid
Contact: Mr. A. (Angel) Moratilla
Representatives in IUTAM: Mr. A. (Angel) Moratilla

Sweden (1950)

Swedish National Committee for Mechanics
Malmö University , 205 06 Malmö
President/Chair: Prof. P. (Per) Ståhle
Secretary: Prof. S. (Staffan) Lundström
Contact: Prof. D. (Dan) Henningson, Prof. B. (Bengt) Lundberg
Representatives in IUTAM: Prof. D. (Dan) Henningson, Prof. B. (Bengt) Lundberg, Prof. S. (Staffan) Lundström

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
President/Chair: Prof. Y. (Yalcin) Aköz
Secretary: Prof. M.A. (Mehmet Ali) Tasdemir
Contact: Prof. E.S. (Erdogan) Suhubi
Representatives 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. B.L. (Bhushan) Karihaloo
Secretary: Prof. N. (Nigel) Peake
Contact: Prof. N.A. (Norman) Fleck
Representatives in IUTAM: Prof. N.A. (Norman) Fleck, Prof. B.L. (Bhushan) Karihaloo,
Prof. N. (Nigel) Peake, Prof. T.J. (Timothy) Pedley

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
Representatives 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. L. (Lance) Collins
Secretary: Prof. C.T. (Carl) Herakovich
Contact: Prof. C.T. (Carl) Herakovich
Representatives in IUTAM: Prof. N. (Nadine) Aubry, Prof. L. P. (Linda) Franzoni*,
Prof. C.T. (Carl) Herakovich, Prof. S. (Stelios) Kyriakides, Prof. Z. (Zhigang) Suo
**Prof. Hassan Aref was delegate until he passed away on 09 September 2011. Prof. Linda Franzoni was appointed to fill his position.*

Viet Nam (1990)

Vietnamese Association of Mechanics (VAM)
Hoi Co Hoc Vietnam, 264 Doi Can, Hanoi
President/Chair: Prof. N. (Nguyen) Hoa Thinh
Secretary: Prof. D. (Dinh) Van Phong
Contact: Prof. D. (Dinh) Van Phong
Representatives in IUTAM: Prof. N. (Nguyen) Hoa Thinh

Affiliated Organizations

CISM (1970)

International Centre for Mechanical Sciences
Palazzo del Torso, Piazza Garibaldi, I-33100 Udine, Italy
Rectors of CISM: Prof. Giulio Maier (Resident Rector),
Prof. Jean Salençon and Prof. Wilhelm Schneider
President/Chair: Prof. A.V. (Vinicio) Turello
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. H.K. (Keith) Moffatt

ICHMT (1972)

International Centre for Heat and Mass Transfer
Mechanical Engineering Dept., Middle East Technical University,
06531 Ankara, Turkey
President/Chair: G.F. (Geoffrey) Hewitt
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. G.G. Fuller
Secretary: Prof. M.H. (Manfred) Wagner
Contact: Prof. M. (Masato) Abe
Representative of ICR in IUTAM: Prof. L.G. (Gary) Leal
Representative of IUTAM in ICR:

IAVSD (1977)

International Association for Vehicle System Dynamics
Prof. Michael Valásek, Department of Mechanics, Faculty of Mechanical Engineering,
Czech International University in Prague, Kalovo Nanesti 13,
121 35 Praha 2, Czech Republic
President/Chair: Prof. H. (Hans) True
Secretary: Prof. M. (Michael) Valásek
Contact: Prof. M. (Michael) Valásek
Representative of IAVSD in IUTAM: Prof. M. (Mats) Berg
Representative of IUTAM in IAVSD: Prof. W. (Werner) Schiehlen

EUROMECH (1978)

European Mechanics Society

University of Padova, Faculty of Engineering, Dipartimento di Costruzioni e Trasporti,
35131 Padova, Italy

President/Chair: Prof. P. (Patrick) Huerre

Secretary: Prof. B.A. (Bernhard) Schrefler

Contact: Prof. B.A. (Bernhard) Schrefler

Representative of EUROMECH in IUTAM: Prof. P. (Patrick) Huerre

Representative of IUTAM in EUROMECH: Prof. T.J. (Timothy) Pedley

ISIMM (1978)

International Society for the Interaction of Mechanics and Mathematics

Prof. A. (Adriano) Montanaro Università degli Studi di Padova

Via Belzoni 7 35131 Padova Italy

President/Chair: Prof. L. (Lev) Truskinovsky

Secretary: Prof. D. (Davide) Bigoni

Contact: Prof. A. (Adriano) Montanaro

Representative of ISIMM in IUTAM: Prof. M.A. (Michael) Hayes

Representative of IUTAM in ISIMM: Prof. G. (Gérard) Itoos

ICF (1978)

International Congress on Fracture

Prof. T. Yokobori, School of Science and Engineering, Teikyo University,

Toyosatodai 1-1, Utsunomiya, 320, Japan

President/Chair: Prof. A. (Alberto) Carpinteri

Secretary: Prof. A.T. (A.T.) Yokobori Jr.

Contact: Prof. R.M. (Robert) McMeeking

Representative of ICF in IUTAM: Prof. R.M. (Robert) McMeeking

Representative of IUTAM in ICF: Prof. J.B. (Jean-Baptiste) Leblond

ICM (1982)

International Congress on Mechanical Behaviour of Materials,

Prof. F. Ellyin, Dept. of Mechanical Engineering, University of Alberta,

Edmonton, Canada T6G 2G8

President/Chair: Prof. S.W. (Soo Woo) Nam

Secretary: Prof. T. (Toshihiko) Hoshide

Contact: Prof. S.W. (Soo Woo) Nam

Representative of ICM in IUTAM: Prof. S.W. (Soo Woo) Nam

Representative of IUTAM in ICM: Prof. S.R. (Sol) Bodner

AFMC (1982)

Asian Fluid Mechanics Committee

Institute of Mechanics, Chinese Academy of Sciences, No. 15,

North Sihuanxi Rd, Beijing, 100080, China

President/Chair: Prof. J (Jiachun) Li

Contact: Prof. J (Jiachun) Li

Representative of AFMC in IUTAM: Prof. J (Jiachun) Li

Representative of IUTAM in AFMC: Prof. H. (Heng) Zhou

IACM (1984)

International Association for Computational Mechanics

Prof. E. Oñate, International Center for Numerical Methods in Engineering,

Edificio C-1, Gran Capitán s/n, E-08034 Barcelona, Spain

President/Chair: Prof. E. (Eugenio) Oñate

Secretary: Dr. S. R. (Sergio) Idelsohn

Contact: Dr. S. R. (Sergio) Idelsohn

Representative of IACM in IUTAM: Prof. J.T. (John Tinsley) Oden

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

Prof. M. Bonnet, CNRS et Ecole Polytechnique, Laboratoire de Mécanique des Solides,

Ecole Polytechnique, 91128 Palaiseau cedex, France

Secretary: Prof. R. Callego

President/Chair: Prof. M. (Marc) Bonnet

Contact: Prof. M. (Marc) Bonnet

Representative of IABEM in IUTAM: Prof. M. (Marc) Bonnet

Representative of IUTAM in IABEM: Prof. G.R. (Günther) Kuhn

ISSMO (1996)

International Society for Structural and Multidisciplinary Optimization

Prof. G. Rozvany, Department of Structural Mechanics,

Budapest University of Technology and Economics,

Muegyetem rkp. 3, Kmf 35, H-1521 Budapest, Hungary

President/Chair: Prof. K.K. (Kyung) Choi

Secretary: Prof. B.M. (Byung) Kwak

Contact: Prof. N. (Niels) Olhoff

Representative of ISSMO in IUTAM: Prof. G. (George) Rozvany

Representative of IUTAM in ISSMO: Prof. N. (Niels) Olhoff

HYDROMAG (1996)

International Association for Hydromagnetic Phenomena and Applications

Prof. S. Asai, Dept of Mat. Sciences, University of Nagoya,

Furo-cho, Chikusa-ku, Nagoya 464-0, Japan

President/Chair: Prof. R. (René) Moreau

Secretary: Prof. A. (André) Thess

Contact: Prof. A. (André) Thess

Representative of HYDROMAG in IUTAM: Prof. R. (René) Moreau

Representative of IUTAM in HYDROMAG: Prof. H.K. (Keith) Moffatt

IIAV (1997)

International Institute of Acoustics and Vibration

Prof M. J. Crocker. Dept. of Mechanical Engineering, Auburn University,

201 Ross Hall, Auburn, AL 36849 USA

President/Chair: Prof. Hans Boden

Secretary: Prof. Semyung Wang

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. S.N.Y. (Samir) Gerges

Secretary: Mrs. M. (Marion) Burgess

Contact: Mrs. M. (Marion) Burgess

Representative of ICA in IUTAM: Prof. S.N.Y. (Samir) Gerges

Representative of IUTAM in ICA: Prof. A. (Andrew) Norris

ICTS (2002)

International Congresses on Thermal Stresses

Prof. Richard B. Hetnarski, 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. H. (Haiyan) Hu

Representative of BICTAM in IUTAM: Prof. H. (Haiyan) Hu

Representative of IUTAM in BICTAM: Prof. N. (Narinder) Gupta

LACCOTAM (2010)

Latin American and Caribbean Conference on Theoretical and Applied Mechanics

c/o The Department of Math and Computer Science, The University of the West Indies,
St. Augustine, Trinidad, West Indies

President/Chair: Prof. F. (F.) Malpica

Secretary: Dr. D. M. G. (Donna) Comissiong

Contact: Prof. H. (Harold) Ramkissoon

Representative of LACCOTAM in IUTAM: Prof. H. (Harold) Ramkissoon

Representative of IUTAM in LACCOTAM:

Members of the General Assembly

<i>Member</i>	<i>Representative of</i>	<i>Remarks</i>
Prof. J. (Jan) Achenbach		Member-at-Large
Prof. A. (Andreas) Acrivos		Member-at-Large
Dr. M.I. (Mohammed ibn Ibrahim) Al-Suwaiyel	Saudi Arabia	
Prof. F. (Franca) Arruda	Brazil	
Prof. N. (Nadine) Aubry	USA	
Prof. Y. (Yi-long) Bai	China	
Prof. A. (Ahmed) Benallal	France	
Prof. L. (Luiz) Bevilacqua	Brazil	
Prof. G. (Gautam) Biswas	India	
Prof. B. (Bruno) Boley		Member-at-Large
Prof. R. (René) de Borst	Netherlands	
Prof. P. (Philippe) Boulanger	Belgium	
Prof. D. (Dimar) Camotin	Portugal	
Prof. D.H. (Dick) van Campen	Netherlands	Member-at-Large
Prof. S. (Sébastien) Candel	France	
Prof. C.-C.(Chien Cheng) Chang	China-Tapei	
Prof. F. (Francois) Charru	France	
Prof. F.L. (Felix) Chernousko	Russia	Bureau member
Dr. J.P. (Jim) Denier	Australia	
Prof. F. (Frédéric) Dias	France	Bureau member
Prof. E. (Erik) Dick	Belgium	
Prof. J. (Jürg) Dual	Switzerland	
Prof. P. (Peter) Eberhard	Germany	
Prof. H. (Horia) Ene	Romania	
Prof. N.A. (Norman) Fleck	UK	
Prof. M. (Maciej) Floryan	Canada	
Prof. L. P. (Linda) Franzoni	USA	
Prof. B. (Ben) Freund	USA	Bureau member
Prof. M. (Michael) Gilchrist	Ireland	
Prof. S. Gopalakrishna	India	
Prof.I.G.(Irina) Goryacheva	Russia	
Prof. J. (John) Grue	Norway	
Prof. N. (Narinder) Gupta	India	Bureau member
Prof. W. (Witold) Gutkowski	Poland	
Prof. A.N. (Alexandr) Guz	Ukraine	
Prof. D. (Dan) Henningson	Sweden	

Member	Representative of	Remarks
Prof. C.T. (Carl) Herakovich	USA	
Prof. N.(Nguyen) Hoa Thinh	Viet Nam	
Prof. J. (Jan) Hult		Member-at-Large
Dr. S.R. (Sergio) Idelsohn	Argentina	
Prof. M.K. (Mohamed) Ismail	Egypt	
Prof. G. (George) Jaiani	Georgia	
Prof. S. (Sandor) Kaliszky	Hungary	
Prof. T. (Tutomu) Kambe	Japan	
Prof. V. (Vladimir) Karev	Russia	
Prof. B.L. (Bhushan) Karihaloo	UK	
Prof. J.T. (John) Katsikadelis	Greece	
Prof. R. (Reinhold) Kienzler	Germany	
Prof. K. (Kikuo) Kishimoto	Japan	
Prof. A. (Alfred) Kluwick	Austria	
Prof. S. (Schalk) Kok	South Africa	
Prof. S. (Stelios) Kyriakides	USA	
Prof. J. (Jiachun) Li	China	Representative of AFMC
Prof. A.Y.T. (Andrew) Leung	China-Hong Kong	
Prof. F. (Fernando) Lund	Chile	Bureau member
Prof. B. (Bengt) Lundberg	Sweden	
Prof. S. (Staffan) Lundstrom	Sweden	
Prof. G. (Giulio) Maier	Italy	
Prof. S. (Stevan) Maksimovic	Serbia	
Prof. Y. (Youichirou) Matsumoto	Japan	
Prof. S. (Sanjay) Mittal	India	
Prof. K. (Keith) Moffatt		Member-at-Large Chair WP-9
Prof. A. (Alain) Molinari	France	
Prof. P.A. (Peter) Monkewitz	Switzerland	
Mr. A. (Angel) Moratilla	Spain	
Prof. N.F. (Nikita) Morozov	Russia	
Prof. A. (Angelo) Morro	Italy	
Prof. R. (Roddam) Narasimha		Member-at-Large
Prof. N. (Naosi) Nishimura	Japan	Representative of IABEM
Prof. M. (Martin) Oberlack	Germany	
Prof. M. (Miloslav) Okrouhlik	Czech Republic	
Prof. N. (Niels) Olhoff	Denmark	Bureau member
Prof. J. (Juha) Paavola	Finland	
Prof. N. (Nigel) Peake	UK	
Prof. T.J. (Timothy) Pedley	UK	Bureau member
Prof. P. (Paolo) Podio-Guidugli	Italy	
Prof. S. (Stefan) Radev	Bulgaria	

<i>Member</i>	<i>Representative of</i>	<i>Remarks</i>
Prof. E. (Eduardo) Ramos	Mexico	
Prof. G. (Giuseppe) Rega	Italy	
Prof. M.B. (Miles) Rubin	Israel	
Prof. S.B. (Stuart) Savage	Canada	
Prof. A. (Andrus) Salupere	Estonia	
Prof. W. (Werner) Schiehlen		Member-at-Large
Prof. S. (Suresh) Shrivastava	Canada	
Prof. L. (Leopold) Skerget	Slovenia	
Prof. J. (Jan) Sladek	Slovakia	
Prof. S. (Scott) Sloan	Australia	
Prof. R. (Rolf) Stenberg	Finland	
Prof. Z. (Zhigang) Suo	USA	
Prof. A.A. (Anton) v. Steenhoven	Netherlands	
Prof. E.S. (Erdogan) Suhubi	Turkey	
Prof. G. (Gwidon) Szefer	Poland	
Prof. J.N. (Jens Nørkær) Sørensen	Denmark	
Prof. V. (Vitauts) Tamuzs	Latvia	
Prof. T. (Tomomasa) Tatsumi		Member-at-Large
Prof. A. (André) Thess	Germany	Bureau member
Prof. G. (Goran) Turkalj	Croatia	
Prof. D. (Dirk) Vandepitte	Belgium	
Prof. W.-C. Wang	China-Taipei	
Prof. G. (Graham) Weir	New Zealand	
Prof. L. (Leen) van Wijngaarden		Member-at-Large
Prof. W. (Wei) Yang	China	Chair WP-7
Prof. J.Y. (Jung Yul) Yoo	Republic of Korea	
Prof. Z. (Zhemin) Zheng	China	
Prof. J.W. (Jean) Zu	Canada	

Observers to the General Assembly

<i>Name</i>	<i>Country</i>	<i>Representative of</i>
Prof. O. (Olivier) Allix	France	Chair WP-3
Prof. F. (Faruk) Arinc	Turkey	ICHMT
Prof. M. (Mats) Berg	Sweden	IAVSD
Prof. M.J. (Malcolm) Crocker	USA	IIAV
Prof. S.N.Y. (Samir) Gerges	Brazil	ICA
Prof. M. (Michael) Hayes	Ireland	ISIMM
Prof. R.B. (Richard) Hetnarski	USA	ICTS
Prof. G. (Gerhard) Holzapfel	Austria	Chair WP-6
Prof. H. (Haiyan) Hu	China	BICTAM
Prof. P. (Patrick) Huerre	France	EUROMECH
Prof. P. (Pierre) Ladevèze	France	Chair WP-5
Prof. G. (Gary) Leal	USA	ICR Chair WP-1 Chair SP Fluids
Prof. L. (Jiachun) Li	China	AFMC
Prof. P. (Paul) Linden	UK	Chair WP-8
Prof. R.M. (Robert) McMeeking	USA	ICF Chair WP-4
Prof. R. (René) Moreau	France	HYDROMAG
Prof. S.W. (Soo Woo) Nam	Canada	ICM
Prof. J.T. (John Tinsley) Oden	USA	IACM
Prof. H. (Harold) Ramkissoon	West Indies	LACCOTAM
Prof. G. (George) Rozvany	Hungary	ISSMO
Prof. B.A. (Bernhard) Schrefler	Italy	CISM
Prof. Y. (Yiorgos) Smyrlis	Cyprus	Associate Organization
Prof. V. (Viggo) Tvergaard	Denmark	Chair SP Solids
Prof. H.Y. (Hiroshi) Yabuno	Japan	Chair WP-2

Members of the Congress Committee

*Year indicates end of term

<i>Member</i>	<i>Country</i>	<i>Year*</i>	<i>Remarks</i>
Prof. N. (Nadine) Aubry	USA	2012	
Prof. Y. (Yi-Long) Bai	China	2012	Member of XCCC
Prof. L. (Leslie) Banks-Sills	Israel	2012	
Prof. D. (Dominique) Barthès-Biesel	France	2012	
Prof. M.P. (Martin) Bendsøe	Denmark	2012	Member of XCCC
Prof. D.H. (Dick) van Campen	Netherlands	2012	Member of XCCC
Prof. A. (Alberto) Carpinteri	Italy	2012	
Prof. G.-D. (Gengdong) Cheng	China	2012	
Prof. R. (Renato) Cotta	Brazil	2014	
Prof. F. (Frédéric) Dias	France	2012	
Prof. P. (Peter) Eberhard	Germany	2014	
Prof. B. (Bruno) Eckhart	Germany	2014	
Prof. I.G. (Irina) Goryacheva	Russia	2012	
Prof. N.K. (Narinder) Gupta	India	2012	
Prof. G. (Gertjan) van Heijst	Netherlands	2014	
Prof. C.T. (Carl) Herakovich	USA	2014	
Prof. Y. (Yukio) Kaneda	Japan	2012	
Prof. T.A. (Tomasz) Kowalewski	Poland	2012	Member of XCCC
Prof. S. (Stelios) Kyriakides	USA	2012	
Prof. P. (Pierre) Ladevèze	France	2012	
Prof. L.G. (Gary) Leal	USA	2012	
Prof. J.B. (Jean-Baptiste) Leblond	France	2014	
Prof. J. (Jacques) Magnaudet	France	2012	
Prof. R.M. (Robert) McMeeking	USA	2012	
Prof. N.F. (Nikita) Morozov	Russia	2014	
Prof. R.W. (Ray) Ogden	UK	2012	
Prof. N. (Nigel) Peake	UK	2014	
Prof. T.J. (Timothy) Pedley	UK	2012	Member of XCCC
Prof. K. Ravi-Chandar	USA	2014	
Prof. G. (Gabor) Stépan	Hungary	2014	
Prof. H. (Howard) Stone	USA	2014	
Prof. K. (Kazuo) Tanishita	Japan	2014	
Prof. A. (André) Thess	Germany	2012	
Prof. V. (Viggo) Tvergaard	Denmark	2012	
Prof. G. (Genki) Yagawa	Japan	2014	

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:			
<i>Member</i>	<i>Country</i>	<i>Year*</i>	<i>Remarks</i>
Prof. H. (Haecheon) Choi	Korea	2014	
Prof. L.G. (Gary) Leal	USA	2012	Chair
Prof. N. (Nigel) Peake	UK	2012	
Prof. K. R. (Katepalli) Sreenivasan	Italy	2014	
Prof. M.A. (Michael) Stiasnie	Israel	2014	
Symposia Panel for Solid Mechanics			
<i>Member</i>	<i>Country</i>	<i>Year*</i>	<i>Remarks</i>
Prof. W. (Wolfgang) Ehlers	Germany	2012	
Prof. N.A. (Norman) Fleck	UK	2012	
Prof. H. (Huajian) Gao	USA	2012	
Prof. G. (Gábor) Stépan	Hungary	2014	
Prof. V. (Viggo) Tvergaard	Denmark	2012	Chair

*Year indicates end of term

Members of the Working Parties

Based on the assessment of IUTAM, the General Assembly agreed in Cambridge, UK (August 2002) to establish nine Working Parties.

A Working Party in a certain subfield of the mechanics is meant to structure the overlapping activities between IUTAM on the one hand and the relevant Affiliated Organizations and sister International Unions on the other. Also, Working Parties should identify important growth areas of the field.

More detailed background information on Working Parties, including their Terms of Reference, is given in the IUTAM Report on Working Parties.

A listing of the Working Parties and their current membership is given below.

WP-1: Non-Newtonian Fluid Mechanics and Rheology

Members: Prof. L.G. (Gary) Leal, USA (chair); Prof. A.N. (Antony) Beris;
Prof. J. R. A. (Anthony) Pearson, UK; Prof. T. (Tam) Sridhar, Australia;
Prof. D. (Dimitri) Vlassopoulos, Greece; Prof. H. (Hiroshi) Watanabe, Japan

WP-2: Dynamical Systems and Mechatronics

Members: Prof. H.Y. (Hiroshi) Yabuno, Japan (chair); Prof. F.L. (Felix) Chernousko,
Russia; Prof. R.S. (Robin) Sharp, UK; Prof. M. (Masayoshi) Tomizuka, USA

WP-3: Mechanics of Materials

Members: Prof. O. (Olivier) Allix, France (chair); Prof. C.T. (Carl) Herakovich, USA;
Prof. T. (Tatsuo) Inoue, Japan; Prof. S. (Stelios) Kyriakides, USA; Prof. Y. (Yulong) Li,
China

WP-4: Materials Processing

Members: Prof. R.M. (Robert) McMeeking, USA (chair); Prof. S. (Shigeo) Asai, Japan;
Prof. Y. (Yves) Brechet, France; Prof. R. (René) Moreau, France;
Prof. A. (André) Thess, Germany; Prof. C.L. (Charles) Tucker III, USA

WP-5: Computational Fluid and Solid Mechanics

(this WP acts as link between IUTAM and IACM)

Members: Prof. P. (Pierre) Ladevèze, France (chair); Prof. E. R. (Eduardo) de Arantes
e Oliveira, Portugal; Prof. J. (Jacob) Fish, USA; Dr. S. R. (Sergio) Idelsohn, Argentina;
Prof. J. T. (Tinsley) Oden, USA, Prof. M.W. (Mingwu) Yuan, China

WP-6: Biomechanics

Members: Dr. G.A. (Gerhard) Holzapfel, Austria (chair); Prof. D. (Dominique) Barthès-
Biesel, France; Prof. J.E. (Joan) Bechtold, USA; Prof. R.W. (Ray) Ogden, UK;
Prof. K. (Kazuo) Tanishita, Japan

WP-7: Nano- and Micro-Scale Phenomena in Mechanics

Members: Prof. W. (Wei) Yang, China (chair); Prof. F. (Fernand) Ellyin, Canada;
Prof. Y. (Yonggang) Huang, USA; Dr. G. (Graham) Weir, New Zealand

WP-8: Geophysical and Environmental Mechanics

Members: Prof. P.F. (Paul) Linden, UK (chair); Prof. H. (Hervé) Le Treut, France;
Prof. J.W. (John) Rudnicki, USA; Prof. J. Srinivasan, India; Dr. P. (Luis) Thomas,
Argentina

WP-9: Education in Mechanics and Capacity Building

Members: Prof. H.K. (Keith) Moffatt (chair); Prof. H. (Hassan) Aref[†] USA ; Prof. L.
(Luiz) Bevilacqua, Brazil; Dr. I. (Igle) Gledhill, South Africa; Prof. H. (Haiyan) Hu,
China; Prof. K.R. (Katepalli) Sreenivasan, Italy

Donations in 2011

Donations given to IUTAM Symposia are recorded under the heading “Financial Support” of the Reports of Symposia and Summer Schools held in 2011.

IUTAM Representation in ICSU and its Scientific Committees

<i>Acronym</i>	<i>Organization/Scientific Committee</i>	<i>Representative of IUTAM</i>
ICSU	International Council for Science	Prof. T. J. Pedley
COSPAR	Committee on Space Research	Prof. G. G. Chernyi
SCOPE	Scientific Committee on Problems of the Environment	Prof. P.F. Linden
SCOR	Scientific Committee on Oceanic Research	Prof. M. Stiassnie

Report of IUTAM Symposia held in 2011

11-1 IUTAM Symposium on Mechanics of Liquid and Solid Foams

Austin, Texas, US, May 08 – May 13, 2011

a) Scientific Committee

Co-Chairs: Prof. Stelios Kyriakides, University of Texas at Austin
Dr. Andrew M. Kraynik, Sandia National Laboratories (retired)

Members: Prof. Lorna J. Gibson, MIT, USA
Prof. Norman A. Fleck, University of Cambridge, UK
Prof. Nobutada Ohno, Nagoya University, Japan
Prof. Simon Cox, University of Wales Aberystwyth, UK
Prof. Reinhard Hohler, Universite de Marne-la-Vallee, France
Prof. Dominique Langevin, Universite Paris XI, France

b) Short summary of scientific progress achieved

A unique international symposium on the *Mechanics of Liquid and Solid Foams* was held at the University of Texas at Austin in May 8-13, 2011. The symposium was organized under the auspices of the International Union of Theoretical and Applied Mechanics. It consisted of 38 presentations conducted in a single session format over a period of five days. Approximately 50 researchers from 14 countries from both the liquid and solid foam communities came together. A strong effort was made to include younger researchers among the participants. Their backgrounds included chemical and mechanical engineering, physics, applied mathematics, fluid and solid mechanics. This breadth of disciplines and backgrounds provided a unique opportunity for cross-fertilization of ideas, techniques and approaches, to the underlying mechanics problems. Subjects covered included foam processing, foam rheology and drainage, mechanics of microstructured cellular materials and lattices, characterization of foam microstructure using X-ray tomography and other techniques, relationship of elastic and inelastic properties of solid foams to microstructure, dynamic behavior of cellular materials, and others. Theory, experimentation and numerical approaches and often combinations of these were covered in the course of the symposium.

The success of the symposium depended strongly on the participants to whom we express our gratitude. The assistance of the scientific committee in selecting the participants is acknowledged with thanks. Special mention goes to Stavros Gaitanaros for his help in the organization of the symposium, development of the program and for pulling together the Proceedings. We also thank Karon Selman and Sara Ricke for administrative help.

c) Countries represented and number of lecturers

50 participants from 14 countries

d) Publication of Proceedings of the Symposium

Full journal quality papers were requested from the participants. They were organized into two groups: Sixteen articles dealing with “solid” foams and, more generally, cellular materials were submitted to the International Journal of Solids and Structures. The articles were peer reviewed in accordance with the editorial policies of the Journal with S. Kyriakides acting as Editor. The articles will appear as a special issue of this Journal in early summer of 2012. Six articles dealing with “liquid” foams were processed similarly through the Journal of Rheology with Andrew M. Kraynik acting as Guest Editor. They have appeared in the May, 2012 issue of this Journal.

e) Financial support

The financial support of the following organizations is acknowledged with thanks:

- National Science Foundation, Mechanics and Materials Program
- The International Union of Theoretical and Applied Mechanics
- The US National Committee of Theoretical and Applied Mechanics
- Elsevier, Oxford, UK
- The Research Center for Mechanics of Solids, Structures and Materials, The University of Texas at Austin

f) Scientific Program

The full scientific program as well as most of the oral presentations can be accessed through the symposium website:

<http://www.ae.utexas.edu/IUTAM2011/index.html>

Report prepared by S. Kyriakides and M. Kraynik

11-2 IUTAM Symposium on Linking Scales in Computations: From Microstructure to Macroscale Properties

Pensacola, Florida, US, May 17 – May 19, 2011

a) Scientific Committee

Belytschko, B. (Northwestern Univ.), Barlat, F. (Pohang Univ.), Brocks, W. (Germany), Cazacu, O. (Univ. Florida, Chair), Leblond, J-B. (UPMC, IUTAM representative), Molinari, A (Univ. Metz), Van Houtte (K U Louvain), Voyadjis, G. (Louisiana State Univ.)

b) Short summary of scientific progress achieved

The ability of multi-scale numerical simulations to provide useful information for macro-scale properties hinges critically on collaboration between numerical analysts, mechanics, and material scientists. To make such simulations useful, it is necessary that key physical phenomena at the various scales be identified and numerical methods be developed to address these mechanisms. The goal of the Symposium was to bring together scientists from different disciplines who are striving for an improvement and enhancement of virtual design of microstructures and processes. A special emphasis has been placed on the effects of the heterogeneity of structure at the microscales on macroscale behavior and how this can be effectively treated in bridging the scales and in microscale computations. Extensions of continuum approaches that incorporate atomistic/molecular phenomena were discussed as well. Applications of such multi-scales approaches to modeling metallic materials (heterogeneity of grain structure, the interaction of grains with dislocations, and the heterogeneity of void distributions and sizes) geological materials (effect of grain size, intergranular friction and self-organization, localization and shear bands formation) and biological materials and processes have been presented.

Lectures were followed by lively and interesting discussions. Many participants expressed the opinion that the Symposium was very informative and challenging due to the problem formulations, spectrum of method of Solutions and applications.

c) Countries represented and number of lecturers

33 participants from 7 countries: Belgium (3), Canada (1), France (7), Germany (2), Netherlands (1), Switzerland (1), USA (18)

d) Publication of Proceedings of the Symposium

The Proceedings of the Symposium will be published in Procedia IUTAM.

e) Financial support

The Scientific Committee is indebted to IUTAM for the financial support to some of the invitees. Additional sponsorship provided by the US National Committee and US National Academies is gratefully acknowledged.

f) Scientific Program

May 17, 2011

Session: Discrete-Continuum Modeling: I

Chair: Prof G. Z. Voyiadjis, Louisiana State University, Baton Rouge, LA, USA

8:45 *Keynote* J. Fish, Rensselaer Polytechnic Institute, Troy, NY, USA

Computational Continua

9:30 T. Junge, Ecole Polytechnique Fédérale de Lausanne, Switzerland

Linking discrete dislocations and molecular dynamics in 3D: A start

10:00 D. Moldovan, Louisiana State University, Baton Rouge, LA, USA

Hierarchical atomistic-mesoscale simulations of microstructure evolution and deformation in nanocrystalline materials

Session: Discrete-Continuum Modeling: II

Chair: Prof F. Darve, Laboratoire Sols, Solides, Structures – INPG, UJF, CNRS, Grenoble, France

10:45 *Keynote* C. A. Duarte, University of Illinois at Urbana-Champaign, IL, USA

Bridging scales with a generalized finite element method

11:30 R. C. Picu, Rensselaer Polytechnic Institute, Troy, NY, USA

Coupled discrete-continuum models for mechanics problems in metals and polymers

12:00 *Keynote* A. Acharya, Carnegie Mellon University, Pittsburgh, PA, USA

Entropy of a constrained Hamiltonian system and mesoscale mechanics

12:45 H. M. Mourad, Los Alamos National Laboratory, Los Alamos, NM, USA

Interface-dominated behavior of multilayered metallic composites

Session: Discrete-Continuum Modeling: III

Chair: Prof. P. Van Houtte

2:30 PM J. Andrade, California Institute of Technology, Pasadena, CA, USA

Multi-scale modeling and characterization of granular matter: from grain kinematics to continuum mechanics

3:00 PM *Keynote* M. G.D. Geers, Eindhoven University of Technology, Eindhoven, Netherlands

Continuous-discontinuous scale transitions for localization in heterogeneous materials

4:00 PM *Keynote* X. Chen, Columbia University, New York, NY, USA

Hierarchical modeling and simulation of mechanosensitive channels of large conductance

4:45 PM *Keynote* M. J. Buehler, Massachusetts Institute of Technology, Cambridge, MA, USA

Turning weakness to strength

May 18, 2011

Session: Multi-scale Modeling of Deformation of Polycrystalline Materials: I

Chair: Dr. R. Lebensohn, Los Alamos National Laboratory, Los Alamos, NM, USA.

8:30 *Keynote* P. Suquet, Laboratoire de Mécanique et d'Acoustique, Marseille, France

Multi-scale modeling of the mechanical behaviour of polycrystalline ice

9:15 *Keynote* F. Roters, Max-Planck-Institut für Eisenforschung, Dusseldorf, Germany

A modular crystal plasticity framework applicable from component to single grain scale

Session: Multi-scale Modeling of Deformation of Polycrystalline Materials: II

Chair: Prof. W. Brocks, Kiel Technical University, Kiel, Germany

10:15 A. J. Beaudoin, University of Illinois at Urbana-Champaign, USA

In-situ measurement of lattice strain and implications for continuum modeling of polycrystals

10:45 *Keynote* P. Van Houtte, Katholieke Universiteit, Leuven, Leuven, Belgium

Multi-scale modeling of the development of heterogeneous distributions of stress, strain, deformation texture and anisotropy in sheet metal forming

11:30 P. Franciosi, LPMTM, University Paris 13, Villetaneuse, France

Microstructure-based multi-laminate approaches of polycrystal plasticity

12:15 A. M. Habraken, Université de Liège, Liège, Belgium

'Smaller is softer' versus 'smaller is stronger' during the miniaturization of Nickel polycrystals: Experimental and numerical approaches

12:45 K. Inal, University of Waterloo, Waterloo, Canada

Numerical modeling of pure bending in aluminum alloys

Session: Multi-scale Modeling in Fluids

Chair: Dr. S. Balachandar, University of Florida, Gainesville, FL, USA

2:30 PM *Keynote* G. Karniadakis, Brown University & Massachusetts Institute of Technology, Cambridge, MA, USA

Dissipative particle dynamics and the triple-decker algorithm with applications to biomedical modeling

3:15 PM H. S. Udaykumar, University of Iowa, Iowa City, IA, USA

Multiscale modeling of shock interactions with heterogeneous materials

3:45 PM G. Jacobs, San Diego State University, San Diego, USA

Higher-order Eulerian-Lagrangian methods for shocked-particle-laden flow computation

Session: Gradient Plasticity for Linking Scales

Chair: Dr. Martin Schmidt, Air Force Research Laboratory, Eglin, FL, USA

4:15 PM *Keynote* G. Z. Voyiadjis, Louisiana State University, Baton Rouge, LA, USA

Microstructure to macro-scale using gradient plasticity with temperature and rate dependent length scales

5:00 PM *Keynote* F. Darve, University Joseph Fourier, Grenoble, France

Second-order work, kinetic energy and failure

May 19, 2011

Session: Multi-scale Modeling of Damage and Failure in Polycrystalline Materials:

Chair: Prof P. Suquet, LMA-CNRS, Marseille, France

8:30 *Keynote* R. Lebensohn, Los Alamos National Laboratory, Los Alamos, NM, USA

Modeling ductile damage of polycrystalline materials

9:15 R. Brenner, LPMTM, Villetaneuse, France

Numerical computation of the multifield coupling behaviour of composites using Fourier transform

9:45 S. V. Lomov, Katholieke Universiteit, Leuven, Leuven, Belgium

Damage initiation and development in textile composites: spanning nano - micro - meso - macro scales

10:15 O. Cazacu, University of Florida, Shalimar, FL, USA

Effects of the tension-compression asymmetry of the matrix on yielding of porous aggregates

Session: Multi-scale Modeling of Damage and Failure in Polycrystalline Materials:

Chair: Prof. A. Molinari, Metz, France

11:00 *Keynote* S. Ghosh, John Hopkins University, Baltimore, MD, USA

Temporal multi-scaling in image based crystal plasticity finite element modeling of dwell fatigue in polycrystalline titanium alloys

11:45 *Keynote* W. Brocks, Kiel Technical University, Kiel, Germany

Coupling aspects in the simulation of hydrogen-induced stress-corrosion cracking

12:30 N. Jacques, ENSIETA Bretagne, Brest, France

Microinertia effects on dynamic crack propagation in ductile materials

Session: Multi-scale Modeling of Damage and Failure in Polycrystalline Materials:

III Chair: Prof. A. Molinari, University of Metz, Metz, France

2:15 PM *Keynote* A. Combescure, INSA, Lyon, Villeurbanne, France

Ductile dynamic cracking from localization to initiation and propagation

3:00 PM *Keynote* A. Cuitino, Rutgers University, Rutgers, NY, USA

A concurrent multi-scale modeling and simulation strategy for confined granular solids

4:45 PM N. M. Cordero, Mines ParisTech, Evry, France

A third gradient theory to introduce the effect of the surface tension: applications to free surfaces, nano-wires and nanoporous materials

Report prepared by O. Cazacu

11-3 IUTAM Symposium on Human Body Dynamics: From Multibody Systems to Biomechanics

Waterloo, Canada, June 05 – June 08, 2011

The IUTAM Symposium on Human Body Dynamics: From Multibody Systems to Biomechanics was held on June 5-8, 2011, at the University of Waterloo, Canada. Consistent with the goal of IUTAM Symposia, a small group of 27 international experts gathered to discuss the state-of-the-art in the multibody dynamic analysis of human motions, with applications ranging from gait and balance to the prediction of motions and stresses resulting from surgery. The Proceedings of the Symposium have been published in *Procedia IUTAM*. In these *Procedia IUTAM*, the contributions of these 27 experts to biomechanics modelling, computer simulation, and experimental validation are documented.

a) Symposium organizing committee

Jorge Ambrósio, Instituto Superior Tecnico Lisbon, Portugal
Felix Chernousko, Russian Academy of Sciences Moscow, Russia
Javier Cuadrado, University of La Coruña Ferrol, Spain
Scott Delp, Stanford University Palo Alto, USA
Andrés Kecskeméthy, Duisburg-Essen University Duisburg, Germany
József Kövecses, Co-Chair, McGill University Montreal, Canada
John McPhee, Chair, University of Waterloo Waterloo, Canada
Atsuo Takamishi, Waseda University Tokyo, Japan

b) Scope of Symposium

Biomechanics is a very challenging interdisciplinary research topic for the scientific community of multibody dynamics. The goal of this IUTAM Symposium was to bring together an interdisciplinary group of international experts in dynamic modelling, human experimentation, and biomechanics applications. Theoretical and applied mechanics has contributed to the motion research of healthy and disabled human beings through sophisticated modelling and analysis methods. Recently, multibody system dynamics has been successfully applied to studies on human walking and hearing. However, the modelling process has to take into account the dynamical properties of muscles, ligaments, tissues and skin which are not readily available in the engineering community. The design and verification of reliable models for the complex motion of, and within, the human being requires an interdisciplinary cooperation that is facilitated and enhanced by this Symposium.

These Procedia IUTAM will help medical and biomechanics practitioners to improve their techniques since the validated models provide greater insight than experiments alone; use of the models also reduces the number of human experiments required by solely experimental research. On the other hand, multibody dynamicists will get valuable suggestions for new and innovative research activities and modelling techniques.

The 2011 IUTAM Symposium on Human Body Dynamics was a resounding success, with 27 international experts presenting their latest research on modelling methodologies, experimental methods for validation and parameter identification, and biomechanics applications. Methodologies ranged from fundamental approaches based on multibody dynamics or finite element analysis, or an integrated combination of the two. Advanced kinematics was used to study open-loop and closed-loop topologies, and optimal control theory was adapted to biomechanics applications. Specialized models were developed for muscles, tendons, and ligaments, as well as contacts occurring between soft human tissues. To support new methodologies in parameter identification, a number of experimental techniques were used, including molecular and magnetic resonance imaging (MRI), electromyography (EMG), and ultrasound. Motion capture systems were used to track subject kinematics, while force plates and transducers were used to measure contact forces in joints, and between a subject and their environment. Where appropriate, cadavers were used to gather the necessary experimental data. Biomechanics applications were far-ranging and far-reaching, and included gait analysis, human balance and fatigue, and stress analysis in bones and joints. Upper arm motions were modelled to study rotator cuff injury, and detailed multibody models were used to design knee and hip replacements as well as ankle orthoses. Predictive dynamic simulations were used to investigate spinal cord injuries and the outcomes of orthopedic surgeries. Results from bipedal robotics were used to study human motion control, and multibody biomolecular simulations were presented. Multibody dynamic analyses were used to design rehabilitation devices and techniques for injured subjects, and to develop strength training and strategies for high-performance athletes.

c) Countries represented

The 8 members of the Symposium organizing committee are listed above. These individuals, combined with the 27 speakers participating in the Symposium, represent 11 different countries around the globe — making this Symposium a truly international event. The small number of invited speakers is consistent with that recommended by IUTAM for a 3-day Symposium such as this, which is designed to promote in-depth, intimate discussions and new research collaborations. The IUTAM Symposium on Human Body Dynamics was held June 5-8 at the University

of Waterloo in Canada; full details of the venue, talks, and events are available on the Symposium website: <http://iutam2011.uwaterloo.ca>.

Acknowledgements

We gratefully acknowledge the hard work and contributions of the following individuals to the success of this Symposium:

- Matthew Millard for designing the Symposium artwork, developing the LaTeX template, editorial assistance, and conference organization.
- Mohammad Sharif Shourijeh for developing and maintaining the Symposium website, editorial assistance, and conference organization.
- Connie Slaughter for administrative assistance and conference organization.
- Valerie Gerum for conference organization.
- Louise Curtis and Grace Yao of Elsevier for assistance with the Procedia IUTAM.

We would also like to thank Maplesoft Inc. and the Dean of Engineering at the University of Waterloo for their financial support of this Symposium.

Report composed by John J. McPhee and József Kövecses

11-4 IUTAM Symposium on Full-field Measurements and Identification in Solid Mechanics

Cachan, France, July 04 – July 08, 2011

a) Scientific committee

Horacio D. Espinosa (USA), Emmanuel E. Gdoutos (Greece), François Hild (France), Giulio Maier (Italy), Daniel Rittel (Israel), Takashi Yokoyama (Japan)

b) Short summary of the scientific objectives achieved

Nowdays, researchers and engineers have access to huge amounts of experimental data (e.g., up to few million displacement vectors). This information requires ad hoc data processing as opposed to classical methods that deal with a few measurements. Full-field measurements of various types also allow for identifications of linear and non-linear constitutive equations for heterogeneous physical and mechanical fields in the presence of dissipative phenomena, based on (multiscale) full-field or mean-field modeling strategies. The purpose of this symposium was to bring together specialists in the development of experimental techniques and in their use in Mechanics of Materials and Structures. Various aspects such as the following were discussed:

- recent developments of the experimental techniques at different scales in relationship with mechanical applications, combination of different measurement techniques;
- new experimental strategies using various full-field measurement techniques;
- multiscale experimental characterization (for any type of material or loading conditions), including statistical analyses of full-field data;
- new inverse analyses or identification techniques using full-field measurements of different types.

Attention was focused (but not limited to) on the interaction between general fundamental concepts, experimental techniques and specific applications to different material field such as:

- multiscale description of physical and mechanical properties;
- non-linear constitutive equations;
- Continuum Damage Mechanics and Fracture Mechanics.

In all the 28 presentations, full-field measurement techniques were used for various purposes. Most of them are well-established (even commercial ones). Industry is now starting to use these techniques in a quantitative way and follows closely the progress made in that area by academic labs. There are few research teams that still continue to develop new procedures and algorithms. In particular, some techniques bridge the gap between experiments and simulations.

Furthermore, measurement resolutions and uncertainties still need to be assessed (or even modeled) in a systematic manner to make the subsequent analyses meaningful. It is noted that 3D imaging (e.g., CT, MRI, OCT) is emerging as an interesting

extension to existing optical techniques and will open new frontiers in the fields of biomechanics, mechanics of materials and structures.

In terms of identification techniques, different approaches are being pursued with more and more complex constitutive models being analyzed. These techniques allow for parametric identification to be particularly robust. However, the choice of the metrics associated with the comparison between experimental data and numerical results is still an open question.

c) Countries represented

45 registered delegates from 10 countries participated in this symposium:

Belgium: 1, China: 1, France: 25, Italy: 3, Japan: 1, the Netherlands: 3, Singapore: 1, Sweden: 1, UK: 3, USA: 6

d) Publication of the proceedings

Twenty one papers were provided by the authors at the beginning of the symposium. They were all peer-reviewed thereafter. The last versions are currently being processed so that the proceedings (published by Elsevier under Procedia IUTAM) can be finalized.

e) Financial support

ENS Cachan, CNRS, EADS foundation, IUTAM provided some financial support. For the latter, it allowed 7 PhD students to participate at a reduced rate.

f) Scientific Program

The scientific program included 28 presentations, 5 discussion sessions. In addition, the laboratory of Mechanics and Technology was presented to the participants during the symposium.

July 4, 2011, Measurement and Identification at Small Scales

9:00 am, H. Sehitoglu – University of Illinois at Urbana Champaign (USA)

Slip transfer at twin and grain boundaries

9:40 am, J. Petit – PIMM, Arts et Métiers ParisTech (France)

DIC performances to evaluate stress field at the micron scale from X-ray Laue microdiffraction patterns

10:40 am, J.P.M. Hoefnagels – Eindhoven University of Technology (the Netherlands)

A global digital image correlation enhanced full-field bulge test method

11:20 am, F. Amiot – FEMTO-ST Institute, Besançon (France)

Surface mechanics and full-field measurements for micromechanical sensors

Measurement and Identification at Different Scales

2:00 pm, J. Helm – Lehigh University, Easton, PA (USA)

Measuring soil-structure interaction on laterally loaded piles with digital image correlation

2:40 pm, G. Maier, Politecnico di Milano (Italy)

Practical advantages of full-field measurements and proper orthogonal decomposition for diagnostic analysis of dams and for free-foils characterization

3:40 pm, F. Latourte – EDF R & D, Moret sur Loing (France)

Full-field measurements as a tool for assessing industrial issues – Two examples

4:20 pm, Discussions

July 5, 2011, Applications in Biomechanics

9:00 am, B. van Rietbergen – Eindhoven University of Technology (the Netherlands)

Biomechanics of bone structure and strength: From in vivo to in silico analysis

9:40 am, H.D. Espinosa – Northwestern University, Evanston, IL (USA)

Tablet-level origin of toughening in abalone shells and translation to synthetic nanocomposite materials

10:40 am, G. Ravichandran – California Institute of Technology, Pasadena, CA (USA)

Three-dimensional traction force microscopy for studying cellular interactions with biomaterials

11:20 am, C.T. Lim – National University of Singapore (Singapore)

Mapping the migration of epithelial cells

Identification Techniques 1

2:00 pm, M. Grédiac – LaMI, University of Clermont-Ferrand (France)

Identifying constitutive parameters from heterogeneous strain fields using the Virtual Fields Method

2:40 pm, R. Fedele – Politecnico di Milano (Italy)

Simultaneous assessment of interface parameters and boundary conditions by digital image correlation

3:40 pm, V. Tuninetti – University of Liège (Belgium)

Compression test for metal characterization using digital image correlation and inverse modeling

4:20 pm, Discussions

July 6, 2011, Measurement and Identification

9:00 am, M.A. Sutton – University of South Carolina, Columbia, SC (USA)

Scaling of deformation histories for plates subjected to buried blast loading: Experimental studies

9:40 am, E.A. Patterson – University of Liverpool (UK)

On characterizing strain fields in impact-damaged composites using shape descriptors

10:40 am, S. Yonenyama – Aoyama Gakuin University, Sagamiyama (Japan)

Identification of boundary condition from measured displacements for linear elastic deformation fields

11:20 am, S. Roux – LMT, ENS de Cachan (France)

Mechanical assistance to DIC

Measurement and Identification

2:00 pm, J.M. Guimard – EADS-IW, Suresnes (France)

Towards an industrial transfer of measurement and identification methods using digital image correlation

2:40 pm, Q. Sun – Hong Kong University of Science and Technology (China)

Investigation of material heterogeneity in non-equilibrium solid-solid phase transition by full field measurement method

3:20 pm, Discussions

July 7, 2011, Applications with 3D Imaging

9:00 am, A.M. Korsunsky – Oxford University (UK)

Towards synchrotron X-Ray “rich” tomography

9:40 am, J. Huntley – Loughborough University (UK)

Depth-resolved phase imaging

10:40 am, E.F. Morgan – Boston University, MA (USA)

Digital volume correlation for study of the mechanics of whole bones

11:20 am, M. Sjö Dahl – Luleå University of Technology (Sweden)

Digital volume correlation applied to compaction of granular materials

Applications with 3D Imaging

2:00 pm, S.A. Hall – L3SR, University of Grenoble (France)

Experimental characterization of (localized) deformation phenomena in granular geomaterials from sample down to inter- and intra-grain scales

2:40 pm, J. Réthoré – LaMCoS, INSA de Lyon (France)

Three-dimensional analysis of fatigue crack propagation using X-Ray tomography, digital volume correlation and extended finite element simulations

3:40 pm, Discussions

July 8, 2011, Identification Techniques 2

9:00 am, A. Chrysochoos – LMGC, University of Montpellier (France)

Thermomechanical analysis of the cyclic behavior of materials

9:40 am, F. Laurin – ONERA, Chatillon (France)

Determination of the 3D properties of composite materials thanks to digital image correlation measurements

10:40 am, Discussions and closure

Report composed by F. Hild and H.D. Espinosa

11-5 IUTAM Symposium on Impact Biomechanics in Sport
University College Dublin, Ireland, July 07 – July 09, 2011**a) Scientific Committee**

M. Caine (Loughborough University, UK), D. van Campen (Eindhoven University of Technology, Netherlands; IUTAM representative), R. Greenwald (Dartmouth University, USA), M. Hubbard (University of California at Davis, USA), M. Gilchrist (University College Dublin, Ireland; Chairman), A. McIntosh (University of New South Wales, Australia), G. Nurick (University of Cape Town, South Africa), S. Reid (University of Aberdeen, UK), R. Rodano (Politecnico di Milano, Italy), J. Vander Sloten (Katholieke Universiteit Leuven, Belgium)

b) Short Summary of Scientific Progress Achieved

The symposium was held over 2½ days with the first day focussing on fundamental issues regarding the dynamic mechanical response and trauma of various types of biological tissue. The second day concentrated on the impact response of the constituent materials that are used in sports and personal protective equipment. The final half day involved practising clinicians who related the actual injuries sustained by people to the biomechanics of certain sports. This format stimulated much discussion and helped to define future research challenges for researchers in this subject. This is a multidisciplinary and rapidly expanding area of research which involves the disparate areas of engineering, medicine, materials science, applied mathematics, physics and chemistry. Current scientific problems in the area of impact biomechanics in sport which were addressed during the course of the Symposium include issues pertaining to constitutive materials, including those related to soft and hard biological tissue and novel energy absorption materials, as well as experimental, theoretical and mathematical modelling approaches that may be used to enhance our understanding of the impact response of biological systems. The symposium paid particular attention on how the various limbs, organs and tissues of the human body would respond to moderate or severe impact forces or to blast loads, and how appropriately designed injury protection systems could reduce injury severity and the number of fatalities. One key reason for the success of this interdisciplinary symposium was the emphasis which was placed on promoting interaction between delegates and speakers from the spheres of mechanical engineering and clinical medicine. Topics of specific interest include:

- o Constitutive laws for human tissue
- o Head trauma
- o Musculoskeletal and organ injuries
- o Injury criteria
- o Accident investigation
- o Injury assessment and prevention
- o Injuries due to sports impacts

- o Energy absorption materials and components
- o Equipment design and materials performance
- o Computational mechanics methods

c) Countries Represented and Number of Participants

The meeting attracted 55 participants from 13 different countries (including 17 students and 8 delegates from industry):

Australia (5), Austria (1), Belgium (2), Canada (11), France (2), Ireland (21), Italy (1), Pakistan (1), South Africa (3), Sweden (2), UK (3), USA (2), Vietnam (1).

d) Publication of Proceedings of Symposium

Extended two-page abstracts were distributed in printed book format to all delegates at the symposium (copies of these are available in PDF form by contacting the Symposium Chairman). Subsequent to the symposium, and following normal peer-review of full-length papers, a Special Issue of the IMechE Journal of Sports Engineering & Technology is presently being finalised. This special issue will be published in 2012.

e) Financial Support and Sponsorship

We acknowledge with gratitude the generous support of our sponsors:

- o International Union of Theoretical and Applied Mechanics, IUTAM
- o International Association for Computational Mechanics, IACM
- o Royal Irish Academy, RIA
- o Bertram Broberg Memorial Fund
- o University College Dublin

No financial support was sought or required from IUTAM as sponsorship from other sources was sufficient to permit us to maintain the registration fees at customarily modest levels for IUTAM.

f) Scientific Program

Thursday July 7, 2011

8.45 – 9.00 Welcome Address:

Professor T. Brazil, Secretary, Royal Irish Academy

SESSION 1.

9:00 – 9:45 Keynote lecture - Adding insult to injury: The dynamics of human tissues Ramesh

9:45 – 10:15 Modelling the anisotropic behaviour of skin Ní Annaidh

10:15 – 10:45 Experimental characterization of the mechanical properties of the superior sagittal sinus – bridging vein complex Baeck

11:15 – 11:45 Modelling the impact response of cranial bone Motherway

- 11:45 – 12:15 A new method to determine the young's modulus from fresh bone flaps Forausberger
 12:15 – 12:45 Mechanical properties of brain tissue in tension at high strain rates Rashid

SESSION 2.

- 14:15 – 15:00 Keynote lecture - Biomechanics of traumatic brain injuries and head injury criteria Kleiven
 15:00 – 15:30 The egg Injury criterion. Can we learn more about head injury with an egg surrogate? Short
 15:30 – 16:00 Injury data from unhelmeted football head impacts evaluated against critical strain tolerance curves Patton
 16:30 – 17:00 Traumatic brain injuries investigation using finite element modeling of rat brain Gilchrist
 17:00 – 17:30 Impact performance of ice hockey helmets: head acceleration versus focal force dispersion Ouckama

Friday July 8, 2011

SESSION 3.

- 9:00 – 9:45 Keynote lecture - Biomechanical considerations in the design of equipment to prevent sports injury McIntosh
 9:45 – 10:15 Analysis of loading curve characteristics on the production of brain deformation metrics Post
 10:15 – 10:45 Computational protective helmet component analysis Forero
 11:15 – 11:45 Dynamic impact response characteristics of ice hockey helmets using a centric and non-centric impact protocol Walsh
 11:45 – 12:15 The application of brain tissue deformation values in assessing the safety performance of ice hockey helmets Hoshizaki
 12:15 – 12:45 Impact assessment of jockey helmet liner materials Patton

SESSION 4.

- 14:15 – 15:00 Keynote lecture - Passive and active muscle effects on impacts Pain
 15:00 – 15:30 Validated 3d finite element model of wrist joint Balden
 15:30 – 16:00 Trampoline frame impact attenuation: padded metal-frame vs soft-edge system Eager
 16:30 – 17:00 Falls into via ferrata climbing sets can cause severe injuries for lightweight climbers Litzenberger
 17:00 – 17:30 Upload your head injury! A novel method for biomechanical prediction. Is it feasible? Glenn
 17:30 – 18:00 A comparison of peak linear and angular response between the Hybrid III and the Hodgson-WSU headforms Kendall

Saturday July 9, 2011

SESSION 5.

- 9:00 – 9:45 Keynote lecture - Collision injuries in Rugby Union Ryan
- 9:45 – 10:15 Classification of Collisions in Elite Level Rugby Union using a Wearable Sensing Device Coughlan
- 10:15 – 10:45 An integrated measurement system for analysing impact biomechanics in the rugby scrum Treawartha
- 11:15 – 11:45 Impact reconstruction from damage to pedal- and motor-cycle helmets McIntosh
- 11:45 – 12:15 Head impact conditions in case of bicyclist falling Carreira
- 12:15 – 12:45 Human brain tolerance thresholds for traumatic brain injury from reconstructions Post

12:45 – 13:00

Closing Address: Professor F. Dias, Secretary-General, IUTAM

Report prepared by Michael Gilchrist

11-6 IUTAM Symposium on Computer Models in Biomechanics: from Nano to Macro

Stanford University, USA, August 29 – September 02, 2011

a) Scientific Committee

Ellen Kuhl, Stanford University, Stanford, USA (Chairman), Gerhard Holzapfel, TU Graz, Austria, KTH, Stockholm, Sweden (co-Chairman), Jüri Engelbrecht, Estonian Academy of Sciences, Estonia, Krishna Garikipati, University of Michigan, Ann Arbor, USA, Peter Hunter, University of Auckland, Auckland, New Zealand, Alfio Quarteroni, EPFL, Lausanne, Switzerland, Yiannis Ventikos, University of Oxford, Oxford, UK.

b) Short summary of scientific progress achieved

Biomechanics provides a tremendous selection of new and fascinating areas of application such as the functional adaptation in hard tissues such as bone, teeth, or vertebrae, fracture and healing of bones, mechanically-induced growth and remodeling in arteries, the adaptive response to graft implantation or stenting of vascular tissues, in-stent restenosis, ventricular remodeling, the simulation of actively contracting skeletal or cardiac muscle, and loss or restoration of function in damaged or diseased tissue, to name but a few. This IUTAM Symposium has provided a unique forum to discuss both the mathematical equations that characterize specific biological tissues and the computational tools that can be used to simulate their complex spatial and temporal response.

The Symposium featured 5 keynote speakers to open the morning sessions throughout the week, another 30 invited speakers, and 33 young researchers to give poster presentations on the second afternoon of the meeting. Those young researchers were generously supported by the National Science Foundation NSF and by the IUTAM Symposium support. All keynote lectures were 45 minutes long, invited lectures were 30 minutes long, both with a focus on initiating discussions about the work and critical reflections of the field. To further stimulate discussion, two coffee breaks in the morning and afternoon, and a lunch break were held in the atrium next to the conference room.

This IUTAM Symposium has initiated new collaboration between world leading experts in molecular, cellular, tissue, and organ level biomechanics to shape pathways in tomorrow's multiscale multiphysics modeling of biomechanical phenomena. Thematically, the symposium revealed a number of exciting new trends. Two new aspects have been discussed in detail, which distinguish living biological materials from standard engineering materials: the adaptive response in the form of growth and remodeling and the active response in the form of force generation and contraction. Both were discussed across the scales with contributions on the

molecular, cellular, tissue, and organ levels. Overall, the symposium has created exciting new synergies and novel collaborations, both across the scales and across disciplines. For more information about participants, program, abstracts, and pictures, see website <http://iutam.stanford.edu>.

c) Countries represented and number of participants

68 participants, 35 invited established senior researchers with podium presentations and 33 young scientists with contributed poster presentations, from 14 countries (or regions) took part in this Symposium: USA (29), UK (6), Germany (6), Spain (5), Switzerland (4), Sweden (4), The Netherlands (3), France (3), Austria (3), Belgium (1), Italy (1), Estonia (1), Turkey (1), China (1).

d) Publication of Proceedings of the Symposium

A book of abstracts presented at the symposium had been prepared and distributed to all the participants. The book of abstracts is freely available on the Symposium website <http://iutam.stanford.edu/IUTAMabstracts.pdf>. The book of proceedings will be published as a hardcopy book by Springer in Winter 2012 and will be made available to all participants.

e) Financial support

The following institutions have provided financial support for the Symposium: IUTAM, National Science Foundation NSF and Springer.

f) Scientific program

Monday, August 29, 2011

Morning Session 01 - Keynote Lecture

09:15 - Larry Taber - Modeling Morphodynamics

Morning Session 02 - The Cardiovascular System

10:30 - Jessica Coogan - Coronary and Cerebral Arterial Remodeling

11:00 - Jeffrey Holmes - Multiscale Modeling of Infarct Healing

11:30 - Michael Sacks - Constitutive Models for Valvular Tissues

12:00 - Paul Watton - Patient Specific Modeling of Cerebral Aneurysm Evolution

Afternoon Session 01 - Cells and Viruses I

02:00 - William Klug - Martensitic Phase Transitions in Viral Shells

02:30 - Patrick Onck - A Coarse-Grained Model for the Nuclear Pore Complex

03:00 - Ellen Kuhl - Computational Optogenetics - Turning Light into Force

Afternoon Session 02 - Soft Tissues

04:00 - Ellen Arruda - Native and Tissue-Engineered Anterior Cruciate Ligaments

04:30 - Edoardo Mazza - Experimental Characterization of Soft Human Tissue

05:00 - Peter Pinsky - Collagen-Proteoglycan Interactions in the Corneal Stroma

05:30 - Wolfgang Wall - Bridging Scales in Respiratory Biomechanics

Tuesday, August 30, 2011

Morning Session 01 - Keynote Lecture

09:15 - Peter Hunter - The Physiome Project

Morning Session 02 - Growth and Remodeling

10:30 - Stephen Cowin - Mixture Theory-Based Poroelasticity for Tissue Growth

11:00 - Jay Humphrey - Modeling Arterial Growth and Remodeling

11:30 - David Vorp - Mechanical Properties and Microstructure of ATAA

12:00 - Ralph Müller - Local Bone Formation and Resorption

Afternoon Session 01 - Keynote Lecture

02:00 - Kit Parker - In Vitro Models of Injury in Traumatic Brain Injury

Afternoon Session 02 - Soft Tissues & Muscle

03:00 - Gerhard Holzapfel - Collagen Fiber Orientations and Active Tone in Arteries

03:30 - Markus Böl - Coupled Finite Element Modeling of Smooth Muscle Contraction

04:00 - Jonas Stalhand - Modelling of Smooth Muscle Activation

Poster Session

- Said Ahzi, University of Strasbourg, IMFS, CNRS, Strasbourg, France
- Adrian Buganza Tepole, Stanford University, Stanford, USA
- Xi Cheng, Stanford University, Stanford, USA
- Nele Famaey, Katholieke Universiteit Leuven, Belgium
- Emilie Holland, University of Oxford, UK
- Jordan Kelleher, Purdue University, West Lafayette, USA
- Georges Limbert, University of Southampton, Southampton, UK
- Youjun Liu, Beijing University of Technology, Beijing, China
- Krishnagoud Manda, KTH, Stockholm, Sweden
- Miguel A. Martinez, University of Zaragoza, Zaragoza, Spain
- Lucia Mirabella, Georgia Institute of Technology, Georgia, USA
- Corey Murphey, Stanford University, Stanford, USA
- Saeil C. Murtada, Royal Institute of Technology KTH, Stockholm, Sweden
- Orit Peleg, ETH Zürich, Zürich, Switzerland
- Estefania Pena, University of Zaragoza, Zaragoza, Spain
- Steven Petsche, Stanford University, Stanford, USA
- Jean-Pierre Rabbah, Georgia Institute of Technology, Georgia, USA
- Manuel Rausch, Stanford University, Stanford, USA
- Eva Reina-Romo, University of Seville, Seville, Spain
- Yves Remond, University of Strasbourg, CNRS, France
- Tim Ricken, University of Duisburg-Essen, Germany
- Oliver Röhrle, University of Stuttgart, Germany
- Barbara Röhrnbauer, ETH Zürich, Zürich, Switzerland

- Siva Shankar Rudraraju, University of Michigan, Ann Arbor, USA
- Pablo Saez, Universidad de Zaragoza, Zaragoza, Spain
- Jose A. Sanz-Herrera, Universidad de Seville, Seville, Spain
- Mohammad Reza Shariatmadari, Liverpool John Moores University, UK
- Tyler O'Brien Shultz, Stanford University, Stanford, USA
- Alok Sutradhar, Ohio State University Medical Center, USA
- Michael J. Unterberger, Graz University of Technology, Austria
- Julien Vignollet, University of Glasgow, Glasgow, UK
- Hannah Weisbecker, Graz University of Technology, Graz, Austria
- Jonathan Wong, Stanford University, Stanford, USA
- Goran Zagar, University of Groningen, Groningen, The Netherlands
- Christopher Zarins, Stanford University, Stanford, USA
- Alexander Zoellner, Stanford University, Stanford, USA

Wednesday, August 31, 2011

Morning Session 01 - Keynote Lecture

09:15 - Ajit Yoganathan - Patient-Specific Surgical Planning for the Fontan Procedure

Morning Session 02 - Excitation Contraction

10:30 - Davide Ambrosi - Electromechanical Coupling in Cardiac Dynamics

11:00 - Marko Vendelin - Cooperativity in Huxley-Type Cross-Bridge Models

11:30 - Serdar Göktepe - Kinematic Approaches to Electromechanics of the Heart

12:00 - Michael Sheetz - Cellular Mechanosensing: Stretching Again and Again

Thursday, September 01, 2011

Morning Session 01 - Keynote Lecture

09:15 - Peter Fratzl - Managing Loads by Hierarchical Structure

Morning Session 02 - Porous Media

10:30 - Gerard Ateshian - Solute Transport in Hydrated Biological Tissues

11:00 - Wolfgang Ehlers - Tumor Therapies of Multiphasic Brain Tissue

11:30 - Jaques Huyghe - Multiscale Modelling of Intervertebral Disc Tearing

12:00 - Yiannis Ventikos - Multicompartmental Poroelasticity for Perfused Tissue

Afternoon Session 01 - Cells and Viruses II

02:00 - Krishna Garikipati - Models of Cancer Cell Motility and Locomotion

02:30 - Mohammad Mofrad - Cellular Mechanobiology

03:00 Robert McMeeking - The Mechanics of the Cytoskeleton and Cell Adhesions

03:30 - Closing Remarks

Report prepared by Ellen Kuhl and Gerhard Holzapfel

11-7 IUTAM Symposium on 50 Years of Chaos : Applied and Theoretical
Kyoto, Japan, November 28 – December 02, 2011

a) Scientific Committee

Takashi Hikiyara, Kyoto University, Japan (Chair)

Tsutomu Kambe, The University of Tokyo (Former professor), Japan (Co-Chair)

Dick van Campen, Eindhoven University of Technology, Netherlands (IUTAM Representative)

Philip Holmes, Princeton University, United States

Edwin Kreuzer, Hamburg University of Technology, Germany

Giuseppe Rega, Universita degli Studi di Roma "La Sapienza", Italy

Marian Wiercigroch, University of Aberdeen, United Kingdom

Lai-Sang Young, Courant Institute of Mathematical Sciences, United States

b) Short summary of scientific progress achieved

The symposium focused on the development of theory of dynamical systems and its application since the discovery of chaotic attractors in models of physical systems by Professors Y. Ueda and E. Lorenz in early 1960's. Following Poincare's seminal work in 19th century, nonlinear dynamics was studied largely by mathematicians in Europe, USA, and USSR. The symposium title "50 Years of Chaos" reflects the computational discovery of chaotic attractors, which ushered in a new age of chaos and dynamical systems theory. This theory comprises a broad range of analytical, geometrical, topological, and numerical methods for analyzing differential equations and iterated mappings.

In this symposium it was confirmed that applications of modern dynamical systems theory are spreading beyond the mathematical and physical sciences, although attentions are focused on mechanical, engineering and mathematical aspects.

The symposium gathered international experts in the field of applications and theory of chaos, related to Physics, Biology, Mathematics, and Engineering. After 50 years of the discovery of chaos, these research fields are apparently margining and researchers are interactive over generations like a fractal boundaries. This Symposium confirmed it in the discussions. Science includes inner battles between anti-concepts/principles. Chaos shows it is not simple without an origin. Therefore there is a difficulty to find the targets uniformly in the meso fields in global and local, discrete and continuous, solid and fluid, deterministic and stochastic. Applications and theory are not also clear distinction of research. There is no existence of simple inside and at meso-scale. In the symposium the participants could discuss the future of next 50 years of chaos and started.

The symposium was an overwhelming success. This was mainly due to the extremely high quality program, which was supported by wonderful participants from world. The technical program was comprised of 50 lectures, including 5 special lectures, and 20 poster presentation. The accompanying workshop (NOLTA workshop) was also held at the same place. Details are kept displayed on <http://www-lab23.kuee.kyoto-u.ac.jp/iutam2011/>.

c) Countries represented and number of participants

The IUTAM Symposium had 185 participants from 15 countries. The symposium accepts the participation of students. The number seems to exceed the IUTAM regulation. The students and young researchers could touch with experts directly.

Participants with pre-registration (134) are:

Brazil 1, China 1, France 1, Germany 1, Israel 1, Italy 3, Japan 99, Malaysia 1, Poland 3, Russian Fed 1, Spain 1, Sweden 1, Taiwan 1, United Kingdom 2, United States 17

d) Publication of proceedings of the symposium

The proceedings of the IUTAM are contracted as a series of Procedia online publication from Elsevier since 2011. The proceedings of this symposium will be part of Procedia IUTAM. The deadline of the submission of the camera-ready is March 1st, 2012. The selected authors were invited to the special issue of AIP journal "Chaos" according to the evaluation by all Scientific Committee members. The special issue is expected on December, 2012.

e) Financial support

The symposium organizers received a generous IUTAM sponsorship of \$6000 for inviting external speakers and supporting external speakers who could not have their own funds. The organizers received a fund from the Commemorative organization for the Japan World Exposition '70, amount to about \$18,000 and \$2,400 from Kansai Research Foundation for Technology Promotion. They also received a support of \$4,800 by Osaka Gas Co. Ltd.

f) Scientific Program

Monday, November 28, 2011

14:00-14:30 Opening Ceremony

14:00-14:10 Remark from IUTAM General Assembly

14:10-14:20 Remark by Kambe, Tsutomu (Symposium Co-Chair)

14:20-14:30 Remark by Hikihara, Takashi (Symposium Chair)

Session 1 History of Chaos (Chair: Hikihara, Takashi)

14:30-15:30 Special Lecture: Holmes, Philip, "A Short, Truncated, and Partial History of Chaos"

Session 2 Identification and Chaotic Dynamics (Chair: Kokubu, Hiroshi)

15:40-16:25 Namachchivaya, Navaratnam Sri, "From Random to Data Driven Dynamical Systems: Application to the Lorenz-96 Atmospheric Model"

16:05-16:30 Kohda, Tohru, "Binary Sequences Using Chaotic Dynamics and Their Applications to Communications"

Session 3 Biological Dynamics (Chair: Doi, Shinji)

16:40-17:05 Nakajima, Koji, "Dynamic Characteristics of Neuron Models and Active Areas in Potential Functions"

17:05-17:30 Tsuchiya, Masa, "Finding Biological Roles of Averaging Effect of Large Numbers: The Existence of Genome Vehicles Guiding Cell Fate Decision"

17:30-17:55 Hirata, Yoshito, "Typical Chaotic Dynamics in Squid Giant Axons"

Tuesday, November 29, 2011

9:20-9:30 Remark by Yoshikawa, Kiyoshi, Vice-President of Kyoto University

Session 4 Random and Chaotic Dynamics (Chair: Kohda, Tohru)

9:30-9:55 Balachandran, Bala, "Noise-enhanced Response of Nonlinear Oscillators"

9:55-10:20 Sanjuan, Miguel A. F., "Partial Control of Noisy Chaotic Transients Using Escape Times"

10:20-10:45 Kapitaniak, Tomasz, "How Chaotic (or Random) is the Dice Throw?"

Session 5 Chaos in Mechanical Dynamics (Chair: Balachandran, Bala)

10:55-11:20 Lacarbonara, Walter, "Nonlinear Phenomena in Hysteretic Systems"

11:20-11:45 Gottlieb, Oded, "Chaos in Thermo-visco-elastic Systems Subject to Laser Irradiation"

11:45-12:10 Warminski, Jerzy, "Regular and Chaotic Vibrations of Self-Excited Oscillators Driven by Parametric and External Excitations"

12:10-12:35 Ario, Ichiro, "Hierarchical Structural Analysis for the Multi-folding Structures with Hill-top Bifurcation Points"

Session 6 Nonlinear Engineering (Chair: Hikihara, Takashi)

14:00-15:00 Special Lecture: Moon, Francis C., "Vibro-wind Energy Scavenging: An Example of Nonlinear Engineering"

Session 7 Energy Applications in Dynamics (Chair: Yabuno, Hiroshi)

15:10-15:35 Wiercigroch, Marian, "Complex Dynamics of Pendulums for Energy Harvesting"

15:35-16:00 Moehlis, Jeffery, "An Energy Harvester for Broadband Vibrations"

16:00-16:25 Miyano, Takaya, "Augmented Lorenz Equations as Physical Model for Chaotic Gas Turbine"

Session 8 - Control and Stability in Mechanical Dynamics (Chair: Wiercigroch, Marian)

16:35-17:00 Lenci, Stefano, "Controlling Nonlinear Dynamics of Systems Liable to Unstable Interactive Buckling"

17:00-17:25 Sato, Masayuki, "Analysis of ILM Logic Operations via van der Pol Phase Planes"

17:25-17:50 Yoshimura, Kazuyuki, "Stability of Discrete Breathers in Diatomic Fermi-Pasta-Ulam Type Lattices"

17:50-18:15 Yabuno, Hiroshi, "Stabilization of Buckled Beam with Coulomb Friction by High-Frequency Excitation"

Session 9 Non-smooth Dynamics (Chair: Kapitaniak, Tomasz)

18:25-18:50 Pavlovskaja, Ekaterina, "Chaotic Dynamics of Impact Oscillator with SMA Constraint"

18:50-19:15 Cao, Qingjie, "Non-hyperbolic equilibria of SD oscillator"

Wednesday, November 30, 2011

Session 10 Chaos and Applied Physics (Chair: Moehlis, Jeffery)

9:30-9:55 Uzer, Turgay, "Double Ionization with Intense Laser Pulses: Insights from Chaos Theory"

9:55-10:20 Palacios, Antonio, "Heteroclinic Cycles in Coupled Systems with Applications to Sensor Devices"

10:20-10:45 Longhini, Patrick, "Modeling Coupled Serial Non-Uniform bi-SQUIDS"

Session 11 Statistical Properties in Dynamics (Chair: Daido, Hiroaki)

10:55-11:20 Putkaradze, Vakhtang, "Geometric Approach to the Dynamics of Charged Strings"

11:20-11:45 Komatsu, Nobuyoshi, "Time-Reversibility, Instability and Thermodynamics in N-body Systems Interacting with Long-Range Potentials"

11:45-12:10 Miyazaki, Syuji, "Network Analysis Based on Statistical-Thermodynamical Formalism"

Session 12 Statistical Physics (Chair: Kambe, Tsutomu)

14:00-15:00 Special Lecture: Ruelle, David, "From the Theory of Chaos to Nonequilibrium Statistical Mechanics"

15:10-16:00 Session 13 - Chaos and Fluid Physics (1) (Chair: Mezic, Igor)

15:10-15:35 Cvitanovic, Predrag, "Geometry of State Space in Plane and Pipe Flows"

15:35-16:00 Eckhardt, Bruno, "Turbulence Transition in Shear Flows: Chaos in High-dimensional Spaces"

Session 14 Chaos and Fluid Physics (2) (Chair: Eckhardt, Bruno)

16:10-16:35 Funakoshi, Mitsuaki, "Chaotic Mixing by a Flow in a Curved Pipe"

16:35-17:00 Adachi, Shizuko, "Chaotic Streamlines in Steady Cavity Flows"

17:00-17:25 Mezic, Igor, "Spectral Theory of Nonlinear Fluid Flows Based on the Koopman Operator"

Session 15 Poster Presentations (Chair: Hikihara, Takashi)

17:35-18:35 Short Talks

Session 16 Poster Session

18:35-20:30 Poster

2011 Kyoto Workshop on NOLTA is concurrently held.

Thursday, December 1, 2011

Session 17 Chaos and Communications (Chair: Namachchivaya, Navaratnam Sri)

9:30-9:55 Horio, Yoshihiko, " β -expansion's Attractors Observed in A/D converters"

9:55-10:20 Sunada, Satoshi, "Theory and Experiments of Fast Non-deterministic Random Bit Generation Using On-chip Chaos Lasers"

10:20-10:45 Umeno, Ken, "Exactly Solvable Chaos and Codes for Communications and Analysis"

10:45-11:10 In, Visarath, "Nonlinear Channelizer for RF Communication"

Session 18 - Applied Chaos (Chair: Aihara, Kazuyuki)

11:20-12:20 Special Lecture: Yorke, James, "The Many Facets of Chaos"

Session 19 - Chaos Revolution (Chair: Holmes, Philip)

14:00-14:25 Kokubu, Hiroshi, "Topological-Computational Methods for Analyzing Global Dynamics and Bifurcations"

14:25-14:50 Aihara, Kazuyuki, "Chaos and its Applications"

14:50-15:50 Special Lecture: Ueda, Yoshisuke, "How a Broken Egg Attractor Has Influenced Dynamics of My Life?"

Friday, December 2, 2011

Session 20 Dynamical Systems and Chaos (Chair: Shishikura, Mitsuhiro)

9:30-9:55 Mischaikow, Konstantin, "A Combinatorial Framework for Nonlinear Dynamics"

9:55-10:20 Lenci, Marco, "The Idea of Infinite-Volume Limit for Some Notions of Mixing in Infinite Ergodic Theory"

10:20-10:45 Tucker, Warwick, "Validated Numerics and Hilbert's 16th Problem"

Session 21 Spatio-temporal Dynamics in Physics (Chair: Putkaradze, Vakhtang)

10:55-11:20 Daido, Hiroaki, "Dynamics of Large Ensembles of Coupled Active and Inactive Oscillators"

11:20-11:45 Nakao, Hiroya, "Phase Description of Periodic Solutions in Reaction-diffusion Systems"

11:45-12:10 Ishizaki, Ryuji, "Statistical Properties of Fluctuation for Charged Fine Particles in an AC Trap"

12:10-12:35 Yoshikawa, Kenichi, "Spontaneous Mode Selection of Self-Motile Object under Chemical Nonequilibrium"

Closing Ceremony

12:35-12:45 Remark by Hikihara, Takashi (Symposium Chair)

List of Poster Presentations

1. Budisic, Marko, "Ergodic Coordinates for a Perturbed Hill's Spherical Vortex Flow"

2. Miranda, Rodrigo A., "Lagrangian Coherent Structures at the Onset of Permanent Spatiotemporal Chaos in the 2D Navier-Stokes Equations", (no show)

3. Inubushi, Masanobu, "Covariant Lyapunov Analysis of Chaotic Kolmogorov Flows and Time-correlation Function"

4. Wells, John C., "Tracking Chaotic Behavior in Environmental Hydraulics. Measurement Models for the Temporal Coefficients of Proper Orthogonal Decomposition of Free-Surface Flows"

5. Kecik, Krzysztof, "Chaos in Mechanical Systems: Selected Problems"

6. Woo, Ko-Choong, "Optimised Progression Rates in Soil by means of Vibro-impact Motion"

7. Yokoi, Yuichi, "Tolerance of Delayed Feedback Control for Maintaining Periodic Rotation"

8. Hata, Shigefumi, "Stochastic Phase Reduction for Noisy Limit-cycle Oscillators"

9. Morino, Kai, "Aging Transitions in Multi-layer Networks of Coupled Oscillators"

10. Matsui, Katsuhito, "Fluctuation-spectra of Few- and Large-degrees-of-freedom Chaotic Systems"

11. Nakada, Kazuki, "Noise-induced Phenomena in a Two Strongly Pulse-coupled Spiking Neuron Models"

12. Luan, Le Ba, "Stability Analysis of a Steady State in Three Time-delayed Nonlinear Oscillators Coupled by a Static Connection"

13. Horikawa, Yo, "Exponential Transient Rotating Waves and Their Bifurcations in a Ring of Unidirectionally Coupled Bistable Lorenz Systems"

14. Kimura, Masayuki, "A Study on Intrinsic Localized Modes in a Macro-mechanical Cantilever Array with Tunable On-site Nonlinearity"
15. Teramoto, Hiroshi, "Dynamical Switching of a Reaction Coordinate Triggered by Breakdown of a Normally Hyperbolic Invariant Manifold"
16. Saiki, Yoshitaka, "Relations between Statistical Values along Unstable Periodic Orbits in Differential Equation Systems"
17. Shiro, Masanori, "Chaotic Properties in Musical Sounds"
18. Takahashi, Ryo, "Inner Angles Made of Consecutive Three Points on a Circle for Chaotic and Random Series"
19. Hisakado, Takashi, "Connection from Single-Phase to Three-Phase Circuit Using Free Oscillation Circuits"
20. Susuki, Yoshihiko, "Dynamical Systems Methods for Electric Power Transmission: New Phenomenology and Future Smart Design"

Report composed by T. Hikihara

11-8 IUTAM Symposium on Bluff Body Flows

Kanpur, India, December 12 – December 16, 2011

a) Scientific Committee

Sanjay Mittal, IIT Kanpur, India

Gautam Biswas, IIT Kanpur, India

CHK Williamson, Cornell University, USA

Rajat Mittal, Johns Hopkins University, USA

Peter Bearman, Imperial College, UK

Kerry Hourigan, Monash University, Australia

Franz Durst, University of Erlangen, Nuremberg, Germany

Thomas Leweke, IRPHE/CNRS, France

Tsutomu Kambe, Keio University, Japan

Organizing Committee

Sanjay Mittal, Gautam Biswas, Brijesh Eshpuniyani, Abhijit Kushari, Kamal Poddar, C. S. Upadhyay, Pankaj Wahi, Sameer Khandekar, P. Mohite, V. Shankar, Yogesh Joshi, Mahendra Verma, Subrata Sarkar (IIT Kanpur)

b) Short summary of scientific progress achieved

The symposium was a successful conflux of state of the art research being carried out in bluff body flows. Senior scientists and student researchers from all over the world presented results of their investigations in new fronts. The talks as well as informal discussions led to an increased understanding of physics and engineering applications of the bluff body flows.

The symposium was conducted for five days (12 - 16 Dec). The daily sessions began with topical keynote lectures from invited experts in their fields. There were six keynote lectures. The sessions were categorized on the basis of research areas and specialties and are listed as under:

- **Vortex Induced Vibrations:** Vortex dynamics and energy transfer resulting in body vibrations is an area of active research. The symposium saw results of vibration response under selective flow regimes and oscillation constraints.
- **Bluff Body Wakes:** Results concerning wake characteristics of different body geometries were presented.
- **Stability and Transition:** Instabilities in Bluff body flows is often the route to transition to turbulence. Growth of disturbances under different flow conditions, analysis of transition in bluff body flows were some of the questions addressed in the sessions.

- **Fluid Structure Interactions:** Study of Complex fluid structure interactions, free surfaces and walls were also discussed. These studies have high implications on understanding of real world fluid engineering.
- **Simulation and Modeling:** Computational modeled flows past objects like shuttlecocks, flapping wings and airships were presented, revealing new results in their aerodynamic behavior. Numerical methods for high accuracy simulations were introduced.
- **Flow Control:** Techniques for control and manipulation of flows past bluff bodies with direct applications in engineering technologies were advanced.

With vibrant participation and high quality talks, the symposium accomplished its goal of highlighting latest trends in every domain of bluff body flow mechanics. The scientific interactions were encouraged with the single session format of the symposium. The symposium greatly benefited from the poster sessions that became alive during the tea/coffee breaks. Each poster was entitled to a short talk as well so that all participants become aware of the various posters that were put up. Accommodation for all participants was arranged in the beautiful Campus of IIT Kanpur. All meals were arranged for so that scientific exchanges could continue in this period as well. An evening of Indian Classical music, a half a day visit to the city and a biking tour as a part of the Symposium ensured richer interactions in the participants, especially between the students and senior researchers.

c) Countries represented and number of participants

A total of 108 participants attended the conference representing 15 countries. Of these, 6 were keynote speakers belonging to USA (3), Australia (1), France (1) and India (1). The conference was a good mix of delegates and students, the distribution is as follows:

22 Foreign Delegates, 10 Foreign students, 35 Indian delegates, 35 Indian students

The specific distribution by country of the participants is as follows:

India: 70, France: 10, USA: 6, Australia: 5, Brazil: 3, Italy: 2, Singapore: 2, Belgium: 2, UK: 2, Russia: 1, South Africa: 1, Spain: 1, China: 1, Greece: 1, Hungary: 1

d) Publication of Proceedings of the Symposium

A total of 103 extended abstracts from two to four A4 pages in length, were submitted electronically on the conference portal by the authors. After peer reviewing these submissions, the Scientific Committee selected 54 as oral presentations and 42 as poster presentations, while 7 were found to be out of the scope of conference.

Following the Symposium, a selection of papers was made by the Scientific Committee for expansion into the format required for publication in a special issue of the Journal of Fluids and Structures. All the submissions to the symposium were made through a webportal. The soft copy of symposium proceedings is available at <http://www.iitk.ac.in/blubof2011/proceedings.pdf> . A hard copy was provided to the participants during the time of registration for the conference. It includes 6 papers form keynote lectures, as well as 51 from oral presentations and 30 from poster presentations given at the meeting.

e) Financial support

The registration fee was US\$ 450. However, several participants indicated their inability to pay for this fee. Many of them also requested travel grants. It was, therefore, decided that subsidies will be provided to the participants whenever possible and in a consistent and fair manner. It was decided to provide this subsidy in the form of reduced registration fees. The reduced/subsidized registration fees for the conference were kept as:

Foreign Students: US\$ 300 (Subsidy of US\$ 150)

Indian Delegates: INR 8000 (Subsidy of US\$ 290)

Indian Students: INR 4000 (Subsidy of US\$ 370)

Both online and offline registration facilities were made available. The registration fees for the keynote speakers were waived. Travel support was provided to the keynote speakers only on their request. The local hospitality including their stay and pickup and drop from the local airport was provided for. In addition, the registration fees for some Organizing Committee members as well as student volunteers were waived. The number of registrations for the conference in various categories is indicated below:

Delegates who paid full registration fees of US\$ 450: 20

Foreign students who paid reduced fee of US\$ 300: 10

Indian delegates who paid reduced fee of INR 8000: 31

Indian students who paid reduced fee of INR 4000: 25

Delegates such as keynote speakers for whom the fees was completely waived: 22

A grant of 6000 USD was provided by IUTAM. These funds were utilized to partly offset the subsidies provided to various participants. The total subsidy, in terms of reduced registration fees for the participants is: US\$30,534.

The total amount collected through registration fee was INR 903258. The total expenses for the conference were met through the registration fees and generous support from various agencies such as IIT Kanpur, Department of Science and

Technology (DST), New Delhi; Aeronautical Development and Research Board (AR&DB), India; Council for Scientific and Industrial Research (CSIR) India and John Wiley and Sons, UK.

f) Scientific program:

Day 1: Monday, 12 December 2011

10:50 – 11:30 Opening Lecture by C.H.K. Williamson

New phenomena in Vortex-Induced Vibrations

11:30 – 12:30 Session 1: VIV – 1 [Chair : C.H.K. Williamson]

Carmo, B., Assi, G., *Meneghini, J. Computational simulation of the flow induced vibration of a circular cylinder subjected to wake interference

*Navrose, Mittal, S. 3D computations of free vibrations of a cylinder beyond the laminar regime

*Smith, D. T., Leontini, J., Jacono, D.L., Sheridan, J. Vortex shedding response of streamwise driven cylinders

14:00 – 15:40 Session 2: VIV - 2 [Chair : R. Govardhan]

Bouris, D., *Kostantinidis, E. Numerical study of fluid forces and vortex patterns in the wake of a circular cylinder subject to harmonic and non-harmonic inflow velocity perturbations

*Baranyi, L. Low-Reynolds number flow around a cylinder following a figure-8-path effect of direction of orbit

*Singh, S. P., Biswas, G. Vortex-induced vibrations of a square cylinder at subcritical Re

*Cagney, N., Balabani, S. Vortex Modes and Cylinder Response in Streamwise-only Vortex Induced Vibration

*Fernandes, A.C., Sefat, S. M. Fluttering and Autorotation of a Vertical Flat Plate about a Fixed Axis Submitted to a Uniform Horizontal Flow

16:10 – 17:30 Session 3: Wakes – 1 [Chair : G. Biswas]

*Pier, B. Vortex shedding patterns in the wake of a rotating sphere

*Chetan, S. J., Gaster, M. On the spanwise variation of vortex shedding from slender cones

Sudhakar, Y., *Vengadesan, S., *Mohamed, K. F. Wake characteristics of a circular cylinder attached with an oscillating splitter plate

*Ramesh, O. N. Effect of steady rotation on low Reynolds number vortex shedding phenomenon

Day 2 : Tuesday 13 December 2011

09:00 – 09:40 Invited Lecture by Patrick Huerre

Instability analyses of bluff body wakes: The Karman vortex street

09:40 – 10:40 Session 4: Stability and Transition – 1 [Chair : P. Huerre]

*Alam, M. Global Aerodynamic Instability of Two Cylinders Subjected to Cross Flow

Meena, J., *Mittal, S., Khan, M. H. Sidharth, G. S. Three Dimensional Instabilities in FlowPast a Spinning a Translating Cylinder

*Suryanarayanan, S., Brown, G. Linear and non-linear stability via Biot-Savart computations

11:10 – 12:30 Session 5: Stability and Transition – 2 [Chair : B. Pier]

*Paredas, P., Theofilis, V., Rodriguez, D. On the PSE-3D instability analysis methodology for inhomogeneous shear flows

*Pinto, L. C., Schettini, E. B. C., Silvestrini, J. H. DNS analysis of the turbulence transition wake from a mixed, forced and free oscillating rigid cylinder.

*Cadot, O., Grandemange, M., Gohlke, M., Vilaplana, G., Parezanovic, V. Experimental sensitivity analysis of 3D bluff body turbulent wakes using local disturbances

Bobinski, T., *Goujon-Durand, S., *Wesfried, J. E. Wake behind the disk - influence of disk aspect ratio

14:00 – 14:40 Invited Lecture by Kerry Hourigan (with M. C. Thompson, T. Leweke, M. D. Griffith, J. Leontini, L. Schouveiler, A. Rao)

Wake transitions of bluff bodies impacting and rolling on stationary walls.

14:40 – 15:50 Session 6: Walls and free surface [Chair : K. Hourigan]

*Mirauda, D., Plantamura, A. V., Malavasi, S. Study of the interaction between an oscillating bluff body and a free surface flow

Quadri, R., Larrode, F. E., Negri, M., *Malavasi, S. Numerical modeling of the trajectory of a tethered sphere immersed in a free surface flow

*Satpathy, K., Velusamy, K., Patnaik, B. S. V, Chellapandi, P. Investigation of gas entrainment in a hot pool at free surface during cross flow over a cylindrical component

*Ali, M.S., Tariq, A., Gandhi, B. K. PIV investigation of rib turbulated flow inside a rectangular duct

16:20 – 17:30 Session 7: Separation bubble [Chair : O. Ramesh]

*Gajjar, J. S. B., Zahed, H. H. Stability of separation bubbles in a boundary layer induced by a suction slot

*Behara, S., Narain, C. S. K., Mittal, S. Shear layer instability and laminar separation bubble on an Eppler 61 airfoil

Babu.H., *Sarkar, S. Effect of free stream turbulence on separation bubble

*Nadge, P., Govardhan, R. Flow over a Backward Facing Step: Mean separation bubble and spanwise structure

Day 3 : Wednesday 14 December 2011

09:00 – 09:40 Invited Lecture by George Karniadakis

High Resolution Simulation of VIV

09:40 – 11:00 Session 8: Fluid-Structure Interaction – 1 [Chair : G. Karniadakis]

*Bourguet, R., Karniadakis, G., Triantafyllou, M. Broadband vortex-induced vibrations of a long flexible cylinder

Shukla, S., *Govardhan, R., Arakeri, J. Flow over a bluff body with flexible splitter plates: Plate dynamics, wake velocity fields and forces

Yogeswaran, V., Mittal, S., *Navrose Vortex-induced and galloping response of a rotating circular cylinder

Shirzadeh, R, *Runacres, M., Guillaume, P., Bidakhvidi, M. A. An investigation of the lock-in behavior of an oscillating cylinder in transverse flow

*Suryawansi, A., Ghosh, D. Probabilistic studies on potential flow around submerged bodies

Raghu, V.G., *Mithun, M. G., Patil, P., Tiwari, S Characteristics of unsteady wake for flow past synchronous transverse oscillation of a square prism

*Sridhar, M., Patnaik, B. S. V. Suppression of flow induced oscillations of a circular cylinder by an active flow control strategy

11:30 – 12:30 Session 9: Fluid-Structure Interaction – 2 [Chair: O. Cadot]

*Bhat, S., Govardhan, R. Stall flutter of blades at low Reynolds numbers

Shyamprasad, N. R., Diwakar, S. V, *Tiwari, S, Sundarajan, T. Numerical simulation of external flows around oscillating rigid bodies using a novel fixed Cartesian grid methodology

*Prasad, K., Agrawal, A., Sharma, A. Effect of Cylinder-Spacing on Flow across three side-by-side Cylinders at $Re=100$

14:00 – 15:10 Session 10 : Multiple cylinders [Chair : M . Alam]

Harichandan, A., *Roy, A. Flow past two tandem circular cylinders in the vicinity of a plane wall

*Gowda, B. H. L. Flow field around four square cylinders - a flow visualization study

*Sewatkar, C., Sharma, A., Agrawal, A. Numerical and Experimental Study of Flow around Multiple In-line Square Cylinders

Kumar, G. V. S., *Perumal, A., Dass, A. K. Numerical Simulation of Fluid flow of two tandem circular cylinders using Lattice Boltzmann Method

*Nirmalkar, N., Chhabra, R. Interaction between two spheres falling collinearly in a viscoplastic medium

*Gembarzhevskii, G., Lednev, A. Mode competition of wake behind row of two and three cylinders

Day 4 : Thursday 15 December 2011

09:00 – 09:40 Invited Lecture by Rajat Mittal

From Insect Flight to Heart Murmurs: Computational Modeling of Flow- Structure Interaction in Complex Biological Flows

09:40 – 11:00 Session 12: Simulation and Modeling – 1 [Chair : R. Mittal]

*Shrivastava. M., Agrawal, A., Sharma, A. A Level-Set based Immersed-Boundary Method for Moving Body Problems

*Levy, B., Liu, Y. Z. Cactus spines and grooved cross-section, VIV reducers or self-defense mechanisms?

Mohan, M., *Desai, A., Verma, A., Mittal, S., Aerodynamics of Synthetic Shuttlecocks

Lakshmiathy, S., Suman, S., *Pant, R., Girimaji, S. Application of Partially-averaged Navier-Stokes (PANS) method to simulate turbulent flow around an airship

11:30 – 12:30 Session 13: Simulation and Modeling – 2 [Chair : L. Baranyi]

*Chryst, M., Bouchet, G., Dusek, J. Domain decomposition with a spherical subdomain. A spectral azimuthal decomposition applied to a non axisymmetric geometry

*Anand, V., Patnaik, B. S. V., Rao, B. N. A novel approach for the extraction of vortex structures by using reduced order methods

*Naidu, V., Young, J., Lai, J. Effect of wing flexibility on the flow structure and the performance of dragonfly hovering flight.

*Canchi, T., Lai, J., Young, J. Numerical simulation of flapping wing aerodynamics using simple planform shapes

*Pulipaka, R. K., *Prakash, K. A. Effect of wing cross-section on thrust of a flapping wing

14:00 – 15:30 Session 14: Simulation and Modeling – 3 [Chair : J. Gajjar]

*Sarkar, S., Mandal, R. Control of Cavity Flow Oscillations using Pulsed Fluidic Injection

*Rajani, B. N., Kandasamy, A., Majumdar, S. LES of flow over a circular cylinder at high Reynolds number

Saha, P., *Biswas, G., Sarkar, S. Coherent structures in vortex dominated flow

*Siddharth, K., Sreenivas, K. R., Ansumali, S. Three dimensional unsteady numerical simulations of flow past bluff bodies by Entropic Lattice Boltzmann method

Prasath, S. G., Sudharsan, M., *Jayavel, S. Numerical Study on Influence of Blowing on Lid-Driven Cavity Flow using LCS

*Santhosh, K., Chitharenjan, A., Reji, R., Lal, S. A. Flow past a re-entry vehicle at rarefied hypersonic conditions using Direct Simulation Monte Carlo Method

*Chatterjee, D., Chatterjee, K., Hui, N. B. MHD flow and heat transfer around a square cylinder at low Reynolds numbers

*Roy, C., Kumar, V. Computational Fluid Dynamics In GARUDA Grid Environment

*Dhiman, A. K., Kasar, Y. V. Flow over an Asymmetrically Confined Circular Cylinder to Non Newtonian Power-Law Fluids

Rajkumar, M. *R., Saranya, S., Venugopal, G. Numerical Analysis of Supersonic flow over wall mounted localized protrusions

16:00 – 17:00 Session 15 : Wakes – 2 [Chair : J. E. Wesfried]

Runacres, M., Troyer, T. D., *Shirzadeh, R., Guillaume, P. Identification of the kinematics of an oscillating cylinder using wake velocities

*Ajithkumar, S., Sameen, A., Lal, S. A. Influence of slip on flow past cylinder at low Reynolds number

*Low, H. T., Yu, P. A Numerical Study of the Steady Wake behind a Porous Bluff Body

Singh, J., *Raghu, V., G., Tiwari, S. Effect of aspect ratio and trailing edge elongation of elliptical cylinder on wake characteristics

*Sarkar, A., Schluter, J. Turbulent Energy Budget in the Wake of a Freely Oscillating Elastically Mounted Circular Cylinder

*Sen, S., Kalita, J. Investigation on drag change of a cylinder performing rotatory oscillation

*Ray, R. New findings on α - β Phenomena for Unsteady Flow Past an Impulsively Started Circular Cylinder

*Sharma, N., Dhiman, A. K., Kumar, S. Effect of Buoyancy on the flow and heat transfer across a bluff body of square cross-section

Vimala, S., *Sivakumar, R., *Sekhar, T. V. S. Full MHD flow control over a sphere and heat transfer at low magnetic Prandtl numbers

Agrawal, N., *Dutta, S., Gandhi, B. Control of flow field behind a square prism using control cylinder intermediate reynolds numbers.

*Venugopal, A. Analysis of Vortex Flowmeter Signal with Empirical Mode Decomposition and Autocorrelation Function

Day 5 : Friday 16 December 2011

09:00 – 09:40 Invited Lecture by Jaywant H. Arakeri (with R. K. Shukla)

A unified view of energetic efficiency in active drag reduction, thrust generation and self-propulsion through a loss coefficient with application to flow past a circular cylinder with tangential surface motion

09:40 – 11:00 Session 16: Flow control – 1 [Chair : J. Arakeri]

Raspa, V., Gaubert, C., *Thiria, B. On shed vortices propulsion

*Raspa, V., Diana, R. G. Direct Force Measurements of the propulsive performance of a flapping foil in a hydrodynamic tunnel

*Grandemange, M., Gohlke, M., Cadot, O. On shedding control past a simplified square back road vehicle

*Guilmineau, Queutey, P., Leroyer, A., Wackers, J. Numerical Simulation of Unsteady Flow around an Oscillating Car Model

11:30 – 12:10 Session 17: Flow control – 2 [Chair : E. Guilmineau]

*Pandya, R., Pavithran, S., Nikam, K., Singh, A. A Turbulence based Computational Study on the Drag Breakdown of Ahmed Body

*Venkataraman, D., Bottaro, A., Govindarajan, R. Flow control via porous coating of compliant actuators: a simple interactive model.

Report composed by S. Mittal

Reports of the IUTAM Working Parties

WP-2 – Dynamical Systems and Mechatronics

The primary activity of the Working party WP-2 has been to organize conferences on Dynamical Systems and Mechatronics and/or to serve on their program and scientific committee as summarized below. We continue to give suggestions and discussions with the organizers who propose IUTAM symposia in the next term. Fifty years have passed since the discovery of chaotic attractors in models of physical systems by Ueda (Japan) and Lorenz (USA); IUTAM Symposium on 50 Years of Chaos was held in Kyoto. Although the production mechanism of nonlinear phenomena has been analyzed and the suppression methods have been investigated so far, their positive utilization is yet to be discovered to bring motion control to a level which has not been attained by conventional control methods. To this end, it is very important to join and collaborate with other technical societies whose primary interest is Mechatronics.

Some conferences where members of WP-2 have been actively involved include:

- International Conference on Mathematical Theory of Control and Mechanics, Suzdal, Russia, 1-6 June 2011 (Felix L. Chernousko).
- 7th European Nonlinear Dynamics Conference, ENOC 2011, Rome, Italy, 24-29 July 2011 (Felix L. Chernousko)
- 10th Russian Congress on Fundamental Problems of Theoretical and Applied Mechanics, N.Novgorod, Russia, 24-30 August 2011 (Felix L. Chernousko)
- IUTAM Symposium on 50 Years of Chaos: Applied and Theoretical, Kyoto, Japan, 28 November 28-2 December 2011 (Hiroshi Yabuno),
- IFAC (International Federation of Automatic Control) Congress, Milano, August 28 – September 2, (Masayoshi Tomizuka)

Report composed by Hiroshi Yabuno, Chairman of WP-2

WP-3 – Mechanics of Materials

Olivier Allix (France) Olivier Allix (France) Carl Herakovich (USA), Tatsuo Inoue (Japan), Stelios Kyriakides (USA) and Yulong Li (China)

No meeting of WP3 has been organized in 2012. The committee has supported several proposals of IUTAM conferences for 2013

Materials and interfaces under high strain rate and large deformation, Sébastien Mercier, Jean François Molinari,

Recent developments in impact testing of materials and structures, Yulong Li and strongly support the following proposal by Wim-Kam Liu, Peter Wriggers, Marc Geers, Ted Belytschko, Jacob Fish, for 2014. *Connecting Multiscale Mechanics to Material Complexes Design* (See below)*

View of the chair of the committee on the difficulties to animate the working party.

The committee has faced several difficulties to achieve the goal of the working party which is for a part to encourage the organization of upstream conferences on the mechanics of materials. This is of course the responsibility of its chair. The main problem is analyzed as follows. Mechanics of materials is a very wide subject and the idea behind the present committee was to mix people of different communities. This could have given rise indeed to new proposal on the domain. The problem is that to properly work the members of the committee should have the occasion to meet during one or several of the numerous international conferences that take place on the subject all over the world. But the members of the committee belonging to different communities do not participate to the same conferences and this has not happened.

The chair does not know whether these difficulties have been encountered by other working parties. If it is the case some proposal could be made to improve the situation:

Possibility one: To carefully chose members who have the opportunity to meet on a regular basis in international conferences. Of course this has the possible drawback that not “all” domain will be covered during one mandate. A possible solution is then to select people from another sub-community and over the years a wide aspect of the domain could be efficiently covered.

The second possibility is to act through well known international organizations devoted to the mechanics of materials to try to motivate theme to have someone in their committee responsible for the connection with IUTAM. Then IUTAM provides to all these organizations the list of persons designated by these associations to promote within their community the organization of IUTAM symposia but more important to promote the organization of interdisciplinary IUTAM symposia involving two or several of these organizations. This of course would need quite an effort but this could be really fruitful for the future.

Olivier Allix, Chair of WP3.

Connecting Multiscale Mechanics to Material Complexes Design*

Materials are modular. That is, heterogeneous materials are aggregates of individual components, which we collectively refer to hereafter as multi-component materials. These components act as material building blocks, which by different synthesis and processing techniques self-assemble to form a complex mesostructure or conformation which determines macroscale performance. Design and analysis of such material complexes to resist extreme operating conditions requires modular descriptor-based methodologies that enable modelers to trace and designers to control multiscale “structure-property” metrics. While continuum mechanics concerns the material behavior at macroscopic scales, and quantum mechanics concerns the behavior of electrons and

atoms at the Angstrom scale; however, the material behavior at nanoscale or mesoscale often crucially depends on the bridging of these scales through the integration of multiscale components and multiphysical science. Key physical/chemical/biological phenomena take place in the multiresolution scale, and they cannot be properly described by a single scale theory alone. Due to the multitude of physics, complex multiresolution-structures, and difficulty in matching experiments and simulations, multiresolution scale mechanics of complex materials exhibits a great deal of complexity and stochasticity whose understanding and prediction are still beyond the capacity of current state-of-the-art knowledge base.

Theoretical and computational developments in multiresolution scale mechanics can yield great benefits to develop novel complex materials including metals and alloys, micro- and nano-composites and metamaterials, soft materials like shape memory and electroactive polymers, piezo- and thermo-electrics, biological tissue, and beyond. Through an understanding of these complex materials, significant societal impact can be realized in applications to Energy, Biology, and Materials. In this symposium, we are seeking papers that address the integration of multiscale mechanics with the state-of-the-art uncertainty quantification and engineering design methods that can be used to design new materials and structure systems.

Report composed by Olivier Allix, Chairman of WP-3

WP-5 - Computational Fluid and Solid Mechanics

2011 was marked by numerous computational events, but only on a national level. The largest was the 11th U.S. National Congress on Computational Mechanics in Minneapolis, July 25-28, 2011, with 1100 attendees. That explains why no WP5 meeting was convened in 2011. Conversely, 2012 will be an exceptional year for computational mechanics events with the upcoming European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012) in Vienna, Austria, September 10-14, 2012 and the 10th World Congress on Computational Mechanics in São Paulo, Brazil, July 8-13, 2012 in conjunction with the 33rd Iberian Latin American Congress on Computational Methods in Engineering.

The definition of “Computational Mechanics” retained by WP5 remains the one given by Tinsley Oden:

“Mechanics is the study of the motion of bodies under the action of forces. It encompasses virtually every phenomenon in the physical universe, from the deformation and flow of solids and fluids to the motion of electrons around the nuclei of atoms. Computational mechanics is the science and technology concerned with the use of computational methods and devices to study problems of mechanics. It is more than a science, for it includes as this mission the prediction of physical events governed by the laws of mechanics. It is, thus, the principal tool of engineering. Within its domain are the study and prediction of events on all scales, from the atomic and molecular to the

galactic. Computational mechanics is a remarkably rich, challenging and important discipline in engineering and applied science, which has enriched virtually every aspect of human existence”.

Among the few pressing joint IACM/IUTAM issues, at least two could be proposed as themes for upcoming ICTAM minisymposia: “Model Verification and Validation” and “Model Order Reduction Methods”.

In order to foster synergy between IACM and IUTAM, the WP has retained the idea of organizing an IUTAM/IACM symposium according to the IUTAM rules, and has come up with some suggestions regarding the venue, the date and the title.

Report composed by Pierre Ladevèze, Chairman of WP-5

WP-9 - Education in Mechanics and Capacity Building

The Working Party suffered the grievous loss of Hassan Aref, who had served as its first Chair (2002-2010), and who continued as a member until his death in September 2011. We wish to place on record our deep appreciation for his contributions to the work of WP9, on top of his other heavy responsibilities within IUTAM.

Keith Moffatt has continued to serve on the Council of the African Institute for Mathematical Sciences (AIMS), and also on the Board of AIMS-NEI (the Next Einstein Initiative). As planned, AIMS-Senegal was launched in September 2011, and its first cohort of 32 students from 17 different African States are now in residence on its first 9-month Diploma course. AIMS-Senegal is located on a beautiful nature reserve in Mbour, on the Atlantic coast 80km south of Dakar. AIMS-Ghana is now at an advanced stage of planning, and is provisionally due to open in September 2012. Courses for the various AIMS Centres may be proposed online at <<http://aims.ac.za/en/apply/diploma-course-proposals>>.

The pre-nominated session "Education in Mechanics" has been widely advertised, and it is expected that this session will attract a significant number of submissions for ICTAM2012.

Report composed by Keith Moffatt, Chairman of WP-9

2011 Treasurer's Report

Statement of Change in Fund Balance	USD
Balance, 31 December 2010	385,160
Net revenues minus expenses for 2011	-9,772
Balance, 31 December 2011	375,388

Statement of Cash Revenues Collected over Expenses Paid

Revenues collected during 2011:

Subscription dues	118,971
Return of Symposia grants	0
Interest income	4,264
Total	123,235

Expenses paid during 2011:

Symposia	38,000
Symposia, pre-payment for India, January 2012	6,000
Contribution to ICSU	4,363
Travel, Bureau	16,625
Travel, Congress Committee Executive Committee	9,840
Travel, others	9,700
Website	15,407
Administration & Printing	29,666
Auditor's fee	3,352
Bank fees	471
Total	133,424

Revenues minus expenses for 2011	-10,189
Gain (loss) from exchange of currency	417
Net revenues minus expenses for 2011	-9,772

Statement of IUTAM Bank Accounts
(1 January 2011 through 31 December 2011)

Running Accounts

Bank	Balance 31 Dec. 10	Withdrawals 2011	Deposits 2011	Balance 31 Dec. 11	Currency
Spar Nord Bank Aalborg 9236 457 73 07097	212,219.42	-126,915.26	117,770.29	203,074.45	USD
Spar Nord Bank Aalborg 9236 457 73 07089	2,173.68	-3,970.88	2,832.01	1,034.81	EUR
Spar Nord Bank Aalborg 9236 457 22 92520	13,873.11	-21,375.16	8,654.02	1,151.97	DKK

Savings Accounts

Bank	Balance 31 Dec. 10	Withdrawals 2011	Deposits 2011	Balance 31 Dec. 11	Currency
Citizens Bank Providence	167,640.64	0.00	3,135.95	170,776.59	USD

IUTAM Bank Account Information

Treasurer:

Professor N. Olhoff, Department of Mechanical and Manufacturing Engineering,
Aalborg University, Fibigerstraede 16, DK-9220 Aalborg East, Denmark

Assistant Treasurer:

Professor L. B. Freund, Department of Material Science and Engineering, University of
Illinois at Urbana-Champaign, 1304 W. Green Street, Urbana, IL 61801, USA

Running Accounts:

Spar Nord Bank, Post Office Box 162, DK-9100 Aalborg, Denmark:

USD Account No. 9236 457 73 07097 (changed from 9380 383 88 37963 on 30
September 2011),

EUR Account No. 9236 457 73 07089 (changed from 9380 383 88 37955 on 30
September 2011),

DKK Account No. 9236 457 22 92520.

Subscription Dues Paid in Membership Units

Adhering Organization	2006	2007	2008	2009	2010	2011
Argentina	–	–	–	–	–	–
Australia	3	3	3	3	3	3
Austria	1	1	1	1	1	1
Belgium	5	5	5	5	5	5
Brazil*	1	1	3	3	3	1
Bulgaria**						1
Canada	8	8	8	8	8	8
Chile	1	1	1	1	1	1
China/Beijing	8	8	8	8	8	8
China/Hong Kong	1	1	1	1	1	–

China/Taipei	3	3	3	3	3	3
Croatia	1	1	1	1	1	1
Cyprus***	n/a	n/a	n/a	n/a	n/a	1
Czech Republic	1	1	1	1	1	1
Denmark	3	3	3	3	3	3
Egypt	1	1	1	1	1	1
Estonia	1	1	1	1	1	1
Finland	3	3	3	3	3	3
France	8	8	8	8	8	8
Georgia	1	1	1	1	–	–
Germany	8	8	8	8	8	8
Greece	1	1	1	1	1	1
Hungary	1	1	1	1	1	1
India	5	5	5	5	5	5
Ireland	1	1	1	1	1	1
Israel	3	3	3	3	3	3
Italy	8	8	8	8	8	8
Japan	8	8	8	8	8	8
Korea****	1	–	–	–	–	1
Latvia	1	1	1	1	–	–
Mexico*****	n/a	n/a	n/a	n/a	n/a	–
Netherlands	5	5	5	5	5	5
New Zealand	1	1	1	1	1	1
Norway	1	1	1	1	1	1
Poland	3	3	3	3	3	3
Portugal	1	1	1	1	1	–
Romania	1	1	1	1	1	1
Russia	8	8	8	8	8	8

Saudi Arabia	1	1	1	1	–	1
Serbia	1	1	1	1	1	–
Slovakia	1	1	1	–	–	–
Slovenia	1	1	1	1	1	1
South Africa	1	1	1	1	1	1
Spain	1	1	–	1	–	–
Sweden	5	5	5	5	5	5
Switzerland	3	3	3	3	3	3
Turkey	1	1	1	1	1	1
Ukraine	1	1	1	1	1	1
United Kingdom	8	8	8	8	8	8
United States	12	12	12	12	12	12
Vietnam	1	1	1	1	1	1

Note: For any particular year, a dash (–) indicates that dues had not been paid as of 31 December 2011. Dues are expressed in membership units of 1, 3, 5, 8 or 12, corresponding to category of membership from I through V, respectively.

* Brazil decided to pay 3 units of dues from 2008, but only one unit was paid in 2011.

** According to agreement with IUTAM, Bulgaria has resumed payment of dues from 2011 after accumulation of debt in preceding years. The annual payment is set as one unit due plus a percentage of the debt.

*** Cyprus' Mathematical Society entered IUTAM as an Associate Adhering Organization in 2011.

**** Korea's Adhering Organization in IUTAM shifted to be the newly formed Korean Committee on Theoretical and Applied Mechanics (KCTAM), and dues payment was resumed in 2011.

***** Mexico has entered IUTAM as an Adhering Organization, and the first dues payment was invoiced in 2011 but not paid.

Reports on Affiliated Organizations

AFMC (Asian Fluid Mechanics Committee)

According to the decision of the Asian Fluid Mechanics Committee (AFMC) , the 14th Asian Congress on Fluid Mechanics (ACFM) is to be held in Hanoi, Viet Nam in the autumn of 2013. The major sponsors include the Institute of Mechanics, the Vietnamese Academy of Sciences and Technology (VAST) and the Vietnamese Association of Fluid Mechanics (VAFM) along with other institutions. Professor Duong Ngoc Hai, AFMC member, will coordinate concerned activities and be in charge of ongoing preparation of the coming congress .

In 2012, AFMC further developed the ties with other international congresses organized by Asian countries, such as the 5th BSME ICTE to be held in Bangladesh chaired by Professor A.K.M. Sadrul Islam on December 21-23, 2012.

The year of 2012 is the 30th anniversary of AFMC to be admitted as an affiliated organization of IUTAM. Up to now, we have had 26 committee members from 16 member countries and regions. As major academic activities, a total of 13 congresses have been convened in Bangalore, Beijing, Tokyo, Hong Kong, Daejeon, Singapore, Chennai, Shenzhen, Isfahan, Peradeniya, Kuala Lumpur, Daejeon, Dhaka, respectively, in order to advance the research of fluid dynamics in Asia and strengthen the links between scientists in Asia and the international community.

Report composed by Jiachun Li

BICTAM (Beijing International Center for Theoretical and Applied Mechanics)

With the aim to serve the rapidly increasing interest of the countries in the Asian-Pacific region and other developing countries with the benefit of advancements in the field of theoretical and applied mechanics and their applications, a series of academic activities, including seminars, workshops, and summer schools, have been organized in 2011 by the Beijing International Center of Theoretical and Applied Mechanics, or called the Centre in what follows. Some main events are listed as follows.

1. International Visiting Scholars Program

The regular international visiting scholars program, organized by the Local Organizing Committee (LOC) of the Centre, has attracted a number of well-known

scientists and leading scholars from different countries and regions. Nine scientists and scholars from Japan, the USA, Russia, Canada, China Hong Kong were invited to visit the Centre as guest scholars in 2011. They worked in BICTAM's offices for some time and thus had close contacts with relevant scientists in China with common research interest and efficiently exchanged their most recent research results. The guest scholars presented lectures in the Centre, on different topics covering a diversity of mechanics fields and related sciences, e.g., turbulence, fracture mechanics, micro/nano-biomedical sensors, bioengineering, electro- and magnetomechanical systems, microfluidic system design, and smart materials. Many scholars, especially young researchers and graduates, attended these seminars. These visits and lectures by well-known international scholars enhanced the international influence of BICTAM.

2. **Short Course**

In recognition of the ever increasing technological importance of micro/nano-devices and systems and the key role of mechanics in their design and fabrication, a Short Course on Micro/Nanomechanics was held in June 2011 in the Centre. Famous scientists in this area were invited to give very interesting and attractive lectures of 18 hours in total. The lectures covered the latest developments in micro/nano-devices and systems, mechanics of carbon nanotubes and carbon nanomaterials, and cell biomechanics. More than 40 students, including one fifth from abroad, took part in the course.

3. **Summer School**

Soft matter has become a new multidisciplinary field where theoretical and applied mechanics are crucial. The Summer School on Mechanics of Soft Matter was successfully held at Zhejiang University in December 2011, sponsored by the Centre. 21 distinguished scholars from top universities and institutions in China and the USA, e.g., Professor Zhigang Suo from Harvard University, Professor Huajian Gao from Brown University, Professor Yonggang Huang from Northwestern University, Professor Tianjian Lu from Xi'an Jiaotong University, Professor Quanshui Zheng and Xiqiao Feng from Tsinghua University, gave lectures. The summer school lasted two weeks and more than 170 young researchers and graduate students attended this school.

The lecturers covered a variety of active research topics including, among others, intelligent soft materials, cells and biological macromolecules, flexible electronic devices, biological tissues, biological materials, hydrogels, granular flows, polymers, liquid crystals, colloids and other soft material systems.

4. **LOC meetings**

The LOC of the Centre held several meetings to discuss the further development and other issues of BICTAM. In particular, a detailed plan of the academic activities

which will be held in 2012 was made, in order to enhance the science capability-building. Mainly, the 23rd International Congress of Theoretical and Applied Mechanics (ICTAM 2012) will be held in Beijing on August 19-24, 2012. As part of this conference, BICTAM will organize some workshops, symposia, and short courses, on topics related to Optimization of Structural and Mechanical Systems, Hypersonic and High Temperature Gas Dynamics, etc. A workshop on natural hazards will also be organized by BICTAM in Beijing in 2012. The most severe natural disaster in Asia and Pacific region, such as the 2004 tsunami in the Indian Ocean and 2011 tsunami in Japan, caused enormous damage and claimed tens of thousands of human lives. Focused on the topics of the fundamental processes of tsunamis, BICTAM's 1st Workshop on Natural Hazards – Tsunamis will be held in conjunction with the 5th SCSTW in October 2012 in order to play a major role in mitigating the influence of natural disasters in this area and in the world.

Report composed by Dr. J. Chen

CISM (International Centre for Mechanical Sciences)

1. Courses and Seminars

The regular programme of courses and seminars, planned for the Centre for 2011 by the Scientific Council, took place in two Scientific Sessions, the Germain Session (April-July 2011) and the Herrmann Session (September-October 2011). The topics, always at an advanced level, included different fields of mechanics and related sciences, both at a basic and applied level.

The Germain Session

Noise Sources in Turbulent Shear Flows
Nondeterministic Mechanics
Analysis of Creep and Shrinkage Effects in Concrete Structures
New Trends in Structural Health Monitoring
Plasticity and Beyond: Microstructures, Crystal-Plasticity and Phase Transitions
Experimental and Theoretical Multiscale Analysis of Materials and Structures
Mechanics of Fine Cohesive Powders
Advanced and Bio-Inspired Nanomechanics

The Herrmann Session

Generalized Continua from the Theory to Engineering Applications
Mechanics of Masonry Structures

2. Other Events

Besides the above courses, the following other meetings were organized or hosted by CISM in 2011

- 2° Meeting IU. NET
- EUROMECH 513 – ERCOFTAC - Dynamics of non Spherical Particles in Fluid Turbulence
- CEPET 12th Workshop (Central European Programme. in Economic Theory)
- Workshop on "Uncertain Dynamical Systems"

3. 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.

EUROMECH (European Mechanics Society)

The EUROMECH Council met in Porto on April 15, 2011. For additional information, please consult www.euromech.org

1. Members of the EUROMECH Council in 2012

The composition of the Council is as follows: P. Camanho (Portugal), H.H. Fernholz (Germany), P. Huerre (France), O. E. Jensen (United Kingdom), H. Petryk (Poland), M. Raous (France), B. Schrefler (Italy), W. Schröder (Germany), V. Tvergaard (Denmark), G. J. F. van Heijst (The Netherlands).

Elections to the EUROMECH Council will be held in the Fall of 2012 to replace 4 members.

2. Chairpersons of European Conference Committees 2011-2012

European Solid Mechanics Conference Committee (ESMCC): R. Ogden (UK)

European Fluid Mechanics Conference Committee (EFMCC): J. Magnaudet (France)

European Nonlinear Oscillations Conference Committee (ENOCC): D. H. van Campen (The Netherlands)

European Turbulence Conference Committee (ETCC): D. Lohse (The Netherlands)

European Mechanics of Materials Conference Committee (EMMCC): M. Geers (The Netherlands)

3. EUROMECH Officers

President : P. Huerre (France) ; Vice-President : H.H. Fernholz (Germany);
Treasurer : W. Schröder (Germany) ; Secretary-General : B. Schrefler (Italy)

4. EUROMECH Representative in IUTAM

P. Huerre.

5. Membership

around 2500 members.

6. EUROMECH Conferences

- 8th European Nonlinear Oscillations Conference: summer 2014, Vienna, Austria.
- 9th European Fluid Mechanics Conference: september 9-13, 2012, Rome, Italy.
- 14th European Turbulence Conference: september 2-4, 2013, Lyon, France.
- 8th European Solid Mechanics Conference: july 9-13, 2012, Graz, Austria.
- 13th European Mechanics of Materials Conference: august 31-september 2, 2013, Warsaw, Poland.
- 6th European Postgraduate Fluid Dynamics Conference: july 10-12, 2012, London, United Kingdom.

7. EUROMECH Colloquia 2011-2012

Twelve colloquia in 2011, eleven colloquia in 2012.

8. EUROMECH Prizes and EUROMECH Fellows

2010 EUROMECH Fluid Mechanics Prize: John Hinch

2009 EUROMECH Solid Mechanics Prize: Viggo Tvergaard

2010 EUROMECH Fellows "Fluids": Luca Biferale, Elisabeth Guazzelli

2009 EUROMECH Fellows "Solids": Davide Bigoni, Felix Chernousko, Erik van der Giessen

9. E-CARO European Grant

A grant from the European Union has been awarded to six European learned societies (ECCOMAS, ERCOFTAC, CEAS, EUCASS, EUROMECH, EUROTURBO), in order to encourage the harmonization and dissemination of scientific knowledge in Europe in the field of aeronautics and air transportation. Several mini-symposia and colloquia have been co-organized with these societies. Large scale joint conferences are also being planned.

Report composed by Patrick Huerre

HYDROMAG (International Association for Hydromagnetic Phenomena and Applications)

HYDROMAG is an international association of scientists and engineers active in those 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

<http://www.hydomag.eu/wp/>

This WWW-site contains information on membership, forthcoming conferences and the electronic HYDROMAG newsletter. During the year 2011 several workshops and scientific meetings have been conducted involving the active participation of HYDROMAG and its members.

A group of European Scientists successfully established a network on EPM in frame of the COST-programme of the European Commission called “COST action P17 Electromagnetic Processing of Materials”. The programme supports mutual visits of scientists. Detailed information can be obtained from

<http://www.cost.esf.org/index.php?id=412>

Report composed by André Thess

IABEM (International Association for Boundary Element Methods)

The International Association for Boundary Element Methods (IABEM) was founded in late 1988 by Prof. Thomas A. Cruse of the US, Prof. Luigi Morino of Italy, and Prof. Shoichi Kobayashi of Japan. IABEM aims to advance the research and development of the boundary integral equation (BIE) and boundary element method (BEM) and promote the applications of the BEM in industries.

IABEM organizes the IABEM Symposium to provide a forum for researchers and engineers around the world to discuss the recent developments in the BEM and the new challenges ahead. IABEM Summer School on the BEM has also been offered by IABEM to train students and researchers on the topics of the BEM.

Membership of IABEM is open to all interested researchers, engineers and students in the field of the BEM research with no membership dues. The IABEM is run by the Executive Council and supported by the Scientific Advisory Committee, of which all the members are active researchers in the BEM research and volunteers for IABEM. More detailed informations can be found on <http://www.iabem.org>

The next IABEM Symposium will be held in Santiago, Chile, January 9-11, 2013 (<http://iabem2013.mat.puc.cl/>) and in spring 2015 a symposium is planned in China.

Report composed by Martin Schanz

IACM (International Association for Computational Mechanics)

1. Next IACM World Congress

IACM is currently organizing *the 10th WORLD CONGRESS ON COMPUTATIONAL MECHANICS (WCCM 2012)*. It will take place in the vibrant city of São Paulo, Brazil, on July 8 -13, 2012.

Participants will have the opportunity to meet distinguished colleagues, have a fruitful exchange of ideas and also feel the Brazilians' reputation as a warm and friendly people. The organizers are strongly committed to making this an outstanding, enjoyable and memorable congress.

Seven plenary lectures and twenty-six semi-plenary lectures, addressed by scientists of international reputation in the fields of the congress, complemented by over one hundred and seventy minisymposia, will make this an outstanding, enjoyable and memorable congress.

Further details are available at: <http://www.wccm2012.com/>

2. Several events organized by IACM affiliated associations took place in 2011 (a nonexhaustive list follows)

□ The first conference on Isogeometric Analysis (IGA 2011) took place at the University of Texas at Austin on January 13 – 15 2011. It was jointly sponsored by ICES and the United States Association for Computational Mechanics (USACM).

□ The 19th. UK Association for Computational Mechanics in Engineering (ACME) Conference took place on April 4 – 6, 2011 in Edinburgh, Scotland, in conjunction with the 1st. ACME School.

□ The Japan Society of Computational Engineering and Sciences (JSCES) hosted the XVI Conference on Computational Engineering and Science on May 25 – 27 2011 in Chiba, Japan. JSCES also hold the International Seminar for Nonlinear Computational

Solid Mechanics “Advances in Multiscale Modeling and Analyses” on December 6, 2011,

The 10th. edition of the (French) National Conference on Structural Computational Mechanics (CSMA 2011) took place on May 9 – 13, 2011 near Toulon, France. It was organized by the CSMA Association and the laboratoire de Mécanique et de Génie Civil of the University of Montpellier 2.

The Portuguese (APMTAC) and Spanish (SEMNI) societies organized the joint Congress of Numerical Methods in Engineering 2011 (CMNE 2011) on June 14 – 17 2011 in Coimbra, Portugal.

The 11 USACM National Congress (USNCCM11) took place on July 25– 28, 2011, in Minneapolis, USA.

The 4th. GACM (German Association for Computational Mechanics) Colloquium on Computational Mechanics took place from August 31 to September 2, 2011, at the TU Dresden.

The Chilean Society for Computational Mechanics (CSCM) organized the X Workshop on Computational Mechanics (JCM 2011) on October 12-14 2011 in the city of Santiago de Chile.

AMCA, the Argentine Association of Computational Mechanics, organized the XIX Congress on Numerical Methods and their Applications in Rosario, Argentina, on November 1 - 4, 2011.

The Association of Computational Mechanics Taiwan (ACMT) organized the 3rd. International Symposium on Computational Mechanics (ICSM III) in conjunction with the 2nd. Symposium on Computational Structural Engineering (CSE II) on 5 -7 December 2011, in Taipei, Taiwan.

3. The following IACM supported events took place in 2011:

Reduced Basis, POD and PGD Model Reduction Techniques: a Breakthrough in Computational Engineering?

16 - 18 November 2011, École Normale Supérieure de Cachan, Paris, France
II International Conference on Particle-Based Methods - PARTICLES 2011

26 - 28 October 2011, Barcelona, Spain
V International Conference on Textile Composites and Inflatable Structures – Structural Membranes 2011

5 - 7 October 2011, Barcelona, Spain

IV International Conference on Computational Methods in Marine Engineering - MARINE 2011

28 - 30 September 2011, Lisbon, Portugal

11th. International Conference on Computational Plasticity - Fundamentals and Applications - COMPLAS 2011

7 - 9 September 2011, Barcelona, Spain

Second International Conference on Computational Methods for Thermal Problems

5 - 7 September 2011, Dalian, China

Second Conference on the Extended Finite Element Method - XFEM 2011

29 June - 1 July 2011, Cardiff, U.K.

Workshop on Higher Order Finite Element and Isogeometric Methods - HOFEIM 2011

27 - 29 June 2011, Krakow, Poland

IV International Conference on Computational Methods for Coupled Problems in Science and Engineering - COUPLED PROBLEMS 2011

20 - 22 June 2011, Kos Island, Greece

Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2011)

6 - 8 June 2011, Barcelona, Spain

V International Conference on Adaptive Modeling and Simulation (ADMOS 2011)

6 - 8 June 2011, Paris, France

Fluid Structure Interaction Workshop

27 - 29 April 2011, Singapore

16th International Conference on Finite Elements in Flow Problems - FEF 2011

23 - 25 March 2011, Munich, Germany

2nd African Computational Mechanics Conference

5 - 8 January 2011, Cape Town, South Africa

4. Upcoming IACM supported events:

7th International Conference on Computational Mechanics for Spatial Structures

2 - 4 April 2012, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

Advances in Computational Mechanics — A Conference Celebrating the 70th Birthday of Thomas J.R. Hughes, With Special Track: Finite Elements in Flow Problems (FEF 2013)

24 - 27 February 2013, San Diego, California, USA

V International Conference on Computational Methods in Marine Engineering (MARINE 2013)

29 - 31 May 2013, Hamburg, Germany

VI International Conference on Adaptive Modeling and Simulation (ADMOS 2013)

3 - 5 June 2013, Lisbon, Portugal

Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC-2013)

5 - 7 June 2013, Prague, Czech Republic

4th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2013)

12 - 14 June 2013, Kos Island, Greece

V International Conference on Coupled Problems in Science and Engineering (COUPLED 2013). A Conference Celebrating the 60th. Birthday of Eugenio Onate

17 - 19 June 2013, Ibiza, Spain

XII International Conference on Computational Plasticity (COMPLAS XII)

3 - 5 September 2013, Barcelona, Spain

III International Conference on Particle-based Methods (PARTICLES 2013)

18 - 20 September 2013, Stuttgart, Germany

VI International Conference on Textile Composites and Inflatable Structures (STRUCTURAL MEMBRANES 2013)

9 - 11 October 2013, Munich, Germany

Report composed by Antonio Huerta

IAVSD (International Association for Vehicle Systems Dynamics)

The Workshop on Rail Vehicle Dynamics was held in Kraljevo, Serbia, 12-14 April 2011.

At the workshop 6 survey lectures by IAVSD representatives and 7 presentations of research activities of Balkan researchers were presented. Three manufacturers of railway dynamics simulation software and one manufacturer of measuring equipment presented

their products. The lectures were attended by more than 40 researchers, engineers and students from the Balkan nations and Turkey. Technical visits to the Wagon Factory Kraljevo and the Railway Vehicles Centre of the Faculty of Mechanical Engineering Kraljevo were made.

The main goal of the workshop, to bring together researchers from the developed European countries and Balkan researchers was achieved. The domestic scientists presented railway vehicles dynamics research in the Balkan countries as it is, with all its problems and some potentials that it has. However, we would like to stress that, in the opinion of the local host, the visit and lectures of a group of the leading European researchers have a much deeper impact, which is going to be reflected in the minds of the young researchers and students, who were intrigued and impressed by the lectures, but even more by the open way of presentation of high-level research topics that exposed not only the results of research, but also the temptations and gradual process of their creation. The change of the mindset of the young people and the eventual opening of the small and closed circle of Balkan railway dynamics researchers to international cooperation in the field should be the most important research result of the workshop.

The 22nd IAVSD Symposium was held at Manchester Metropolitan University, UK, 15-19 August 2011. A total of 291 abstracts were submitted, of which 138 were road related and 153 were rail related. 108 papers (37%) were accepted for oral presentation including 48 Road papers and 60 Rail papers and a further 84 papers (29%) were accepted for poster presentation including 42 Road papers and 42 Rail papers. Additionally there were 5 invited state-of-the-art papers, which were published in a special issue of Vehicle System Dynamics issued to all delegates. The SOA lectures at the symposium were:

ROAD

Ammon Rauh: Vehicle System Dynamics Challenges of Electrically Driven Vehicles (Integrated Control of electrically driven vehicles and energy economy)

Robin Sharp, Huei Peng, Michael Valasek: Vehicle Dynamics Applications of Optimal Control Theory

RAIL

Nick Wilson, Huimin Wu, Andreas Haigermoser, Mikael Wrang, Oldrich Polach, Jerry Evans: Assessment of safety against derailment by simulations and vehicle acceptance tests (comparison of the state-of-the-art about the world)

Stefano. Bruni, J. Vinolas, Mats Berg, Oldrich Polach: Modelling of railway vehicle suspension components

COMMON

Martin Arnold, Georg Rill, Klaus F³hrer: Numerical Methods in Vehicle System Dynamics.

Delegates attended from 31 Countries with the following countries sending ten or more delegates: Spain 10, Austria 13, USA 13, Italy 15, China 20, Germany 20, Sweden 34, Japan 35, UK 42.

Seven technical visits were arranged as follows:

Visit 1: Health and Safety Laboratories, Buxton

Visit 2: Ricardo Technical Centre (Vehicle Driveline Systems), Leamington Spa

Visit 3: Ardwick railway depot, Manchester (Siemens DMUs)

Visit 4: Longsight railway depot, Manchester (Alstom Pendolinos)

Visit 5: Wyvern Rail Test Track, Wirsbworth

Visit 6: Rail Accident Investigation Branch, Derby

Visit 7: Bentley Motors factory, Crewe

Report composed by Hans True

ICA (International Commission for Acoustics)

At the ICA General Assembly in August 2010 Michael Vorländer was elected as the President till 2013. The Vice President is Charles Schmid and Antonio Perez-Lopez takes care of all financial issues while Marion Burgess serves another period as the Secretary General.

The major activity for the ICA is the congress held every 3 years. The last was held in Sydney, Australia in 2010 and the next will be held in Montreal, Canada in mid 2013 and we look forward to the assistance of IUTAM in promoting this important activity.

The Board of the International Commission for Acoustics is continuing to work on several other activities of international relevance and political impact. One task is to obtain a greater acknowledgement of the role of acoustics with a view to seeking full membership of ICSU. To this end meetings with ICSU management were held in 2011 and the ICA prepared a poster for presentation at the ICSU congress in Rome.

Another is to strengthen the role of its International Conference Coordination Committee. The welcoming of two new international affiliate organizations, thereby increasing the number to eight, will provide further enhance opportunities for better communication between these bodies.

In many developing countries Acoustics is an emerging and expanding field and the ICA is taking particular interest to assist and guide those countries in the formation of a national Acoustical Society.

The ICA allocates the majority of its annual budget to encourage acoustics activities. The Early Career recognizes excellence in acoustics and the Young Scientist Awards

encourage participation in the congress to enhance the experience of acoustics research environment.

Annually the ICA provides support for specialist symposia which provide opportunities for those working in particular areas of acoustics to meet. The guidelines for selection require some international involvement and there is priority for developing countries. The meetings supported in 2011 include:

- Acoustic Challenges in Aquatic Ecosystem Assessment, May 25-27 (Seattle, USA)
- European symposium on environmental acoustics and on buildings acoustically sustainable, October 26-28 (Caceres, Spain)
- Int conf Applications of Nano technology and Ultrasound, January 12-14 (Trichy, India)
- Workshop: Noise Issues in Developing & Emerging Countries, September 6 (Osaka, Japan)
- XL Winter School on Wave and Quantum Acoustics, February 27-March 4 (Gliwice, Poland)

We expect there will be an increase in support for meetings in 2012 associated with the major activity of the international congress in 2013.

The ICA board has been considering approaches to changes in the governance with a view to facilitating increased involvement from the broader membership base. The proposed changes are being finalized for presentation and voting at the ICA General Assembly in 2012.

The ICA acknowledges the ongoing collaboration with IUTAM and appreciated the participation of the IUTAM representative at the 2010 board meeting and looks forward to further strengthening this link in the future.

Report composed by Marion Burgess

ICF (International Congress on Fracture)

ICF was founded in 1969 at ICF2 in Brighton, England, by Professor Takeo Yokobori with origins at ICF1 in Sendai, Japan in 1965. The International Congress on Fracture (ICF) is today the premier international body for the promotion of industrial, experimental & theoretical research, education and worldwide cooperation among scientists and engineers concerned with the mechanics and mechanisms of fracture, fatigue and structural integrity & safe design of materials, components, structures, and systems.

Over the decades since 1965, ICF has made considerable progress in providing an international forum for fostering and highlighting individual, industrial and national

accomplishments in the overall field of fracture and structural integrity in a wide range of disciplines beyond the traditional arenas - from Biomedical to Geophysics, from nano to mega scales, and from the physical to the holistic and systems modelling. This conveys what ICF means by the general term "Structural Integrity".

The ICF brand is very well established and ICF since May 2011 is known also as "ICF: The World Academy of Structural Integrity". This leading world recognition for some fifty years has been mainly accomplished through the series of quadrennial conferences but also through a series of interquadrennial conferences. Sharing diversity in scientific, technical, educational, social as well as historical aspects, creating thereby synergistic effects as essentially an "Academy".

ICF: The World Academy of Structural Integrity is delighted to have recently signed Memoranda of Understanding (MoU's) with ASTM, CSTAM, DVM, IGF, GGF and others developing thereby a springboard for creative collaboration of ICF: WASI in many countries. We have established a series of Gold Medals and other major Awards for the encouragement and recognition of accomplishments in this field and created a community with a global reach in over 50 countries, ever expanding.

ICF13 will be a very special Quadrennial Conference in Beijing, China, in May 2013 as the First Quadrennial of this new era under the chairmanship of Professor Shou-Wen Yu - and we have plans well developed for the Quadrennial, Interquadrennial and other events over the next decade in many countries and in a range of specialist areas.

ICF: WASI is developing new strategies to meet the growing challenges for the next decade and beyond to provide enhanced safety, integrity and understandings as well as friendly co-operations for the common good globally in this critical field of Structural Integrity in its very widest sense. All documents, Minutes, Reports, Blogs are openly available as well as most importantly all the Proceedings and Research Papers from 1965 onwards, especially on our archival section of the new ICF: WASI website under development, and via the Quadrennial and Interquadrennial websites. We will welcome comprehensive dialogue and creative input from you through the ICF: WASI website.

Report composed by Alberto Carpinteri

ICHMT (International Centre for Heat and Mass Transfer)

ICHMT organized one international symposium and sponsored six in 2011. Details of these meetings can be found on the web site, <http://www.ichmt.org>.

1. Meetings Organized by ICHMT:

“Thermal and Materials Nanoscience and Nanotechnology, TMNN-2011”, 29 May-03 June 2011, in Antalya, Turkey. The symposium was Chaired by Professor Yildiz Bayazitoglu, Rice University, U.S.A.

2. Meetings Co-Sponsored by ICHMT:

“12th UK Heat Transfer Conference” 30 August- 01 September 2011, in Leeds, U.K. The symposium was Chaired by Professor P. Heggs, University of Leeds, U.K.

“4th International Conference on Heat Transfer and Fluid Flow in Microscale, HTFFM-IV”, 04-09 September 2011, in Fukuoka, Japan. The symposium was Chaired by Professor Y. Takata, Kyushu University, Japan. The Symposium Co-Chairmen were Professor K.S. Breuer, Brown University, U.S.A.; Dr. G.P. Celata, ENEA Casaccia, Italy; Professor N. Kasagi, The University of Tokyo, Japan; Professor M. Kawaji, The City College of New York, U.S.A.; Professor J.R. Thome, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland.

“7th Mediterranean Combustion Symposium, MCS-11”, 11-15 September 2011, in Sardinia, Italy. Conference Co-Chairmen were Dr. F. Beretta, Consiglio Nazionale delle Ricerche, Napoli, Italy; Professor N. Selcuk, Middle East Technical University, Ankara, Turkey; Professor M.S. Mansour, Beni Suef University, Beni Suef, Egypt and Professor A. D’Anna, University Federico II, Naples, Italy.

“8th Minsk International Seminar on Heat Pipes, Heat Pumps, Refrigerators, Power Sources, MIS HP-11”, 12-15 September 2011, in Minsk, Belarus. The symposium was Chaired by Professor L.L. Vasiliev, A.V. Luikov Heat & Mass Transfer Institute Minsk, Belarus. Conference Co-Chairman was Professor S. Kakac, TOBB University, Ankara, Turkey.

“Asian Symposium on Computational Heat Transfer and Fluid Flow, ASCHT-2011”, 22-26 September 2011, in Kyoto, Japan. The Symposium was chaired by Professor H. Kawamura, Tokyo Univ. of Science, Suwa, Japan. Conference Co-Chairmen were Professor W.-Q. Tao, Xi’an Jiaotong Univ., China and Professor N. Hur, Sogang Univ., S. Korea.

“International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control, IWHT’2011”, 17-20 October 2011, in Xi’an, Shaanxi, China. The Symposium was chaired by Professor Q. W. Wang, Xi'an Jiaotong University, China; Prof. B. Sunden., Lund University, Sweden and Prof. Y.T. Chen, University of Nevada Las Vegas, U.S.A.

3. The organization of several future meetings has continued. These are:

“International Solar Engineering Program - 2012, ISEP-2012”, 23 June -10 August, 2012, in METU, Ankara, Turkey. Dr. Derek Baker, at Middle East Technical University

(METU), runs this program. Detailed information can be found on the Web site: <http://www.ichmt.org/isep-12/>.

“Advances in Computational Heat Transfer, CHT-12”, 01-06 July, 2012, in Bath, UK. The Symposium Co-Chairmen are Dr. D.A.S. Rees, University of Bath, U.K. and Professor G. De Vahl Davis, The University of New South Wales, Australia. Detailed information can be found on the symposium Web site: <http://www.ichmt.org/cht-12/>.

“International Symposium on Turbulence, Heat and Mass Transfer, THMT-12”, 24-27 September 2012, in Palermo, Sicily, Italy. The Symposium Co-Chairmen are Professor K. Hanjalic, Delft University of Technology, The Netherlands; Professor Y. Nagano, Nagoya Institute of Technology, Japan and Professor F. Rispoli, University of Rome "La Sapienza", Italy. Detailed information can be found on the symposium Web site: <http://www.thmt-12.org/>.

“Sustainable Energy in Buildings and Urban Areas, SEBUA-12”, 14-20 October, 2012, in Kusadasi, Turkey. The Symposium Chair is Professor Emilia-Cerna Mladin, POLITEHNICA University of Bucharest, Romania. Detailed information can be found on the symposium Web site: <http://www.ichmt.org/sebua-12/>.

“4th Conference on Computational Thermal Radiation in Participating Media, CTRPM-4”, 18-20 April, 2012, in Nancy, France. Detailed information can be found on the website: <https://roquefort.nancy-universite.fr/CONGRES/eurotherm2012.php>.

“International Symposium on Multiphase Flow and Transport Phenomena, MFTP-2012”, 22-25 April, 2012, in Agadir, Morocco. Detailed information can be found on the symposium Web site: <http://mftp2012.ensa-agadir.ac.ma/public/index.php>.

“International Workshop on Nano-Micro Thermal Radiation”, 23-25 May, 2012, in Matsushima, Japan. Detailed information can be found on the symposium Web site: <http://www.ifs.tohoku.ac.jp/gcoe/NanoRad2012/index.html>.

“Third International Forum on Heat Transfer, IFHT-2012”, 13-15 November, 2012, in Nagasaki, Japan. Detailed information can be found on the symposium Web site: <http://www.ifht2012.com/>.

“23rd International Symposium on Transport Phenomena, ISTP-23”, 19-22 November, 2012, in Auckland, New Zealand. Detailed information can be found on the symposium Web site: <http://www.istp23.com/>.

“8th World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics, ExHFT-8”, 17-20 June, 2013, in Lisbon, Portugal. Detailed information can be found on the symposium Web site: <http://www.exhft8.org/>.

Report composed by Tugba Gun

ICM (International Congress on the Mechanical Behaviour of Materials)

No report has been provided.

ICR (International Committee on Rheology)

This report on the status of rheological activity worldwide was compiled in preparation for the XVIth International Congress on Rheology, which takes place in Lisbon on August 5-10, 2012. The International Committee on Rheology (ICR) was founded in 1953 at the 2nd International Congress on Rheology in Oxford, UK. The members of the ICR are the National or Transnational Rheology Groups represented by delegates. The officers of the ICR are the Chairman and the Secretary. By tradition, the Chairman is one of the key organizers of the most recent International Congress on Rheology, who serves from the conclusion of that Congress until the conclusion of the next succeeding Congress. The current Chairman is Prof. Gerald (Gerry) G. Fuller, Stanford, USA, co-chair of the XVth International Congress on Rheology, which took place at Monterey, USA, in 2008.

According to its by-laws, the purpose of the ICR is to represent the interests of organized groups of rheologists and of individual rheologists throughout the world with respect to the international aspects of exchange of information, dissemination of knowledge, and the development of the science of rheology. In pursuit of these goals it decides on the location and approximate time for the quadrennial International Congresses on Rheology and special international meetings between such Congresses, assists the host group in the planning and organization of such Congresses or meetings by providing information, assistance on publicity, encourages the information of national societies or groups concerned with rheology by providing interested individuals with information and contacts, and undertakes to establish and maintain contact with other international bodies as needed to further the interests of rheologists and the science of rheology.

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 2008 Congress at Monterey attracted more than 1000 participants from around the globe, making it the largest such Congress on record, and we look forward to an equally successful International Congress in Lisbon in 2012. This healthy growth in the rheological community reflects the vital position of our science in addressing worldwide technological challenges in energy, the environment, and manufacturing.

As developing countries grow their economies, opportunities to establish societies of rheology and rheology user groups emerge. A principal purpose of the International Committee on Rheology is to offer support to such activities. By a donation of the Korean Society of Rheology, a permanent website of the ICR with important information

and direct links to all member society could be established at <http://www.icr.tu-berlin.de>. The Society of Rheology has also responded to this charge, and offered support for funding outreach activities that show the promise of establishing viable societies and groups of rheology throughout the world.

In this respect, the past four years have seen several important developments. The Southern African Society of Rheology established in 2006 and having organized a number of important meetings, was voted into membership in 2008. In 2009, the Romanian Society of Rheology was established and after its successful inaugural meeting organized by Prof. Corneliu Balan of Bucharest, was voted into ICR membership. Recent expansion of the Brazilian economy has led to a subsequent increased need of rheological research and development. On the initiative of Professor Paulo Mendes of Rio de Janeiro, and helped by the enthusiastic support of the current ICR chairman, a Brazilian Society of Rheology was established in 2010, and became a member of the ICR. Most recently, at the Complex Fluids Symposium at IIT-Guwahati, India, in January 2012, the Indian Society of Rheology, which was inactive for several years, was re-initiated. President is Dr. Ashish Lele. Presently, there are close to 130 members of the complex fluids community in India, and the Society intends to work towards improving the industry-academia connect in India in the area of rheology and complex fluids. This will be partly done by organizing at least two training programs every year on the principles and applications of rheology to several focus segments of Indian industry such as plastics, paints, food, personal care products and mining.

The current roster of active member societies of the ICR is given in the following, together with the foundation date:

1. The Society of Rheology (USA) 1929
2. The British Society of Rheology 1940
3. Nederlandse Reologische Vereniging 1950
4. Deutsche Rheologische Gesellschaft 1951
5. Nordic (formerly Swedish) Society of Rheology 1956
6. Australian Society of Rheology 1959
7. Arbeitsgruppe Rheologische Gesellschaft Österreich.Chemiker 1959
8. Groupe Français de Rhéologie 1964
9. Rheology Group of the Czechoslovak Chemical Society 1970
10. Societa Italiana de Reologia 1971
11. The Society of Rheology, Japan 1973
12. Belgian Group of Rheology 1974
13. Sociedad Mexicana de Reologia 1975
14. Israël Society of Rheology 1980
15. Grupo Espanol de Reologia 1981
16. Canadian Rheology Group/Groupe Canadien de Rhéologie 1982
17. Indian Society of Rheology 1983
18. Chinese Society of Rheology 1985
19. Slovene Society of Rheology 1987

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- | | |
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| 20. Korean Society of Rheology | 1989 |
| 21. Swiss Group of Rheology | 1990 |
| 22. Vinogradov Society of Rheology | 1991 |
| 23. Hellenic Society of Rheology | 1998 |
| 24. Portuguese Society of Rheology | 1998 |
| 25. Southern African Society of Rheology | 2006 |
| 26. Romanian Society of Rheology | 2009 |
| 27. Brazilian Society of Rheology | 2010 |

With 27 active member societies organized by honorary members of boards and officers, with a total of some 6000 individual members, with important international journals dedicated to the science of rheology, the field can be considered being in a healthy state.

Report composed by Manfred H. Wagner

ICTS (International Congresses on Thermal Stresses)

The main activity was the organization of

***THE NINTH INTERNATIONAL CONGRESS ON THERMAL STRESSES,
BUDAPEST, HUNGARY, JUNE 6 - 9, 2011.***

The Congress was held on the campus of the Budapest University of Technology and Economics, Hungary, and in the main building of the Hungarian Academy of Sciences, both in downtown of Budapest. The accommodation of participants was arranged at Hotel Gellert. The Congress was well attended, with an excellent scientific level for the presentations. Also, the Hungarian hosts organized an excellent social program.

The arrangement of the Congress was as follows.

CHAIRS

General Chair

Andras Szekeres

Department of Applied Mechanics, Budapest University of Technology and Economics

Congress Co-Chairs

Richard B. Hetnarski, Rochester Institute of Technology, USA

Naotake Noda, Shizuoka University, Japan

LOCAL ORGANIZING COMMITTEE

Ecsi, Ladislav (Slovakia), Elesztos, Pavel (Slovakia), Kovacs, Adam (Hungary), Paczelt, Istvan (Hungary), Penninger, Antal (Hungary), Stepan, Gabor (Hungary), and Varadi, Karoly (Hungary)

INTERNATIONAL ORGANIZING COMMITTEE

Aniskevich, Andrey (Latvia), Ashida, Fumihiro (Japan), Batra, Romesh (USA), Chao, Ching Kong (Taiwan), Enikov, Eniko (USA), Giurgiutiu, Victor (USA), Grum, Janez (Slovenia), Hasanyan, Davresh (USA), Heller, Robert (USA), Hetnarski, Richard B. (USA), Heuer, Rudolf (Austria), Jutas, Audrius (Lithuania), Kizilova, Natalya (Ukraine), Marzocca, Pier (USA), Muschik, Wolfgang (Germany), Noda, Naotake (Japan), Ostoja-Starzewski, Martin (USA), Roy, Samit (USA), Talreja, Ramesh (USA), Tauchert, Theodore (USA), Wolff, Ernest (USA)

INVITED LECTURES WERE PRESENTED BY:

1. Berezovski, Arkadi (Estonia) - Engelbrecht, Juri (Estonia) - Maugin, Gerard (France)
2. Hilton, Harry (USA)
3. Iesan, Dorin (Romania)
4. Kizilova, Natalya (Ukraine) - Roy, Samit (USA) - Petrov, Nikola (Bulgaria) - Szekeres, Andras (Hungary)
5. Marzocca, Pier (USA)
6. Mroz, Zenon (Poland) - Paczelt, Istvan (Hungary)
7. Ueda, Sei (Japan)

Participants of the Congress represented 30 countries, with most participants coming from Japan, India, Poland, U.S.A., Hungary, Iran, and Ukraine.

The website of the Congress, <http://ts2011.mm.bme.hu>, was visited 3200 times.

A number of meetings were held during the Congress days. Among them: The meeting of the Executive and the International Committees of the ICTS; the meeting of the Editorial Board of the Journal of Thermal Stresses; and the meeting of the Section Editors of the Encyclopedia of Thermal Stresses, a multi-volume publication in preparation by Springer Verlag.

The next (10th) International Congress on Thermal Stresses will take place at Nanjing University of Aeronautics and Astronautics, Nanjing, China, from May 31 to June 4, 2013. The website of the Congress is <http://ts2013.nuaa.edu.cn> (now under construction).

Report composed by Richard Hetnarski

IIAV (International Institute of Acoustics and Vibration)

The fifteenth IIAV annual election was held in 2011 in which all members voted on candidates for five new director positions and one vice-president position. The elected directors replaced the directors whose four-year terms had expired. The vice-president position is also for a four year term. The five directors elected were: Marc Asselineau, France; Maria Heckl, United Kingdom, Shojiro Kaji, Japan; Jim B. W. Kok, The Netherlands; and Zushi Rao, China. Jorge P. Arenas, Chile was elected as Vice President for Communications. The IIAV Honorary Fellow award was made in 2011 to M. L. Munjal of Bangalore, India to recognize his contributions in acoustics, noise and vibration.

IIAV cooperates with scientific and engineering societies and institutes around the world and lists 41 such affiliated organisations on its website at www.iiav.org. Recently, five new formal agreements of cooperation were signed between IIAV and the Acoustical Society of America; the Acoustical Society of Croatia, the Acoustical Society of Ecuador, the Acoustical Society of Korea and the Acoustical Society of Sweden.

The Eighteenth International Congress on Sound and Vibration (ICSV18), sponsored by the International Institute of Acoustics and Vibration (IIAV), and the Acoustical Society of Brazil (SOBRAC) took place in Rio de Janeiro, Brazil, 10-14 July, 2011. ICSV18 was held in cooperation with the International Union of Theoretical and Applied Mechanics (IUTAM); the American Society of Mechanical Engineers International (ASME International), and the Institution of Mechanical Engineers (IMEchE). Almost 700 abstracts from 50 different countries on all areas of acoustics, noise and vibration were received.

ICSV18 was the first one of the ICSV series to be held in South America. Despite the continuing economic problems around the globe and consequent reductions in travel funding, over 500 participants and accompanying persons attended ICSV18. The ICSV18 Organising Committee, helped by the International Scientific Committee, arranged for 45 special structured sessions in addition to the 26 regular sessions. The sessions were allotted 11 parallel rooms in the Windsor Barra, the congress venue. This hotel is a five-star hotel with excellent conference facilities located in the Barra da Tijuca neighborhood, facing its amazing beach. Barra da Tijuca is Rio's most modern living complex and community, offering innumerable attractions. The ICSV18 banquet, attended by all the congress participants, was held at the thrilling Brazilian Universe. The Samba rhythm, the typical cuisine and the energy of the people made the experience a truly Carioca night. (Carioca is how people born in Rio are called). Many of the IIAV participants took part in the Samba dancing at the ICSV18 banquet.

One Honorary Fellow lecture and six keynote lecture were presented during ICSV18 by engineers and scientists from around the globe. This year the Honorary Fellow lecture

was given by M. L. Munjal from the Indian Institute of Science, Bangalore, India. His lecture topic was “Recent advances in Muffler Acoustics.”

The six keynote lectures were as follows: J. R. F. Arruda, University of Campinas, São Paulo, Brazil, “Discrete Fourier Analysis: Uses, Abuses, and Novel Uses”; Lex Brown, Griffith University, Brisbane, Australia, “Soundscapes and Soundscape Planning;” J. E. Ffowcs Williams, Cambridge University, UK and Lixi Huang, University of Hong Kong, China, “Aeroacoustics;” Mardi C. Hastings, Georgia Institute of Technology, USA, “Sound in the Ocean: Acoustical Interactions with Marine Animals;” Andrei V. Metrikine, Delft University of Technology, The Netherlands. “Stability and Nonlinear Dynamics of Offshore Risers;” and Michael Vorländer, RWTH Aachen University, Germany, “Virtual Acoustics.”

The ICSV18 technical proceedings were made available to delegates at the congress itself on CD-ROM. The ICSV18 CD includes all abstracts and the full texts of all the accepted papers and is now available to all IIAV members on the IIAV website.

The International Journal of Acoustics and Vibration (IJAV), the refereed quarterly journal of IIAV, continues to receive a steady flow of good papers and to be published on schedule. The full papers of current and all back issues of IJAV are displayed on the IIAV website. In addition, hard copies of IJAV are airmailed to all IIAV members and to subscribing libraries all over the world. The IJAV was selected to be indexed in the Science Citation Index Expanded (SCIE) during 2011. The SCIE is part of the Web of Science, Engineering and Computing produced by Thomson Reuters. The IJAV is also indexed in the EBSCO and Elsevier databases.

Report composed by Malcolm J. Crocker (Executive Director IIAV)

ISIMM (International Society for the Interaction of Mechanics and Mathematics)

The Society has organized the next STAMM meeting (STAMM XVIII), which will be held September 3-6, 2012 at the Faculty of Aerospace Engineering of the Technion, Israel Institute of Technology, Haifa 32000, Israel.

Consistently with the aims of ISIMM, the focus will be mathematical modelling of applied problems originating from physics, engineering and other disciplines.

Details are available at <http://ae-www.technion.ac.il/events/stamm>

A new book has been added to the ISIMM series: “Energy Methods in Dynamics,” by Chau Le Khanh (Springer, 2012, ISBN: 978-3-642-22403-4).

Report composed by Davide Bigoni

ISSMO (International Society for Structural and Multidisciplinary Optimization)***1. ISSMO Biennial World Congress on Structural and Multidisciplinary Optimization (WCSMO):***

1.1. WCSMO-9: In 2011 the 9th ISSMO World Congress on Structural and Multidisciplinary Optimization (WCSMO-9) was held in Shizuoka, Japan, June 13-17. Initially 407 papers/abstracts were submitted in 30 topic areas by authors from 46 countries, 393 papers were accepted. The final participation shows that 261 researchers from 23 countries participated in the congress works presenting 194 research works. ISSMO congratulates the local organizers for the excellent work performed under quite difficult circumstances.

1.2. WCSMO-10: following approval by the ISSMO Executive Committee, the next World Congress WCSMO10 will take place in Florida-Orlando, USA. The proposed dates are May 20 – 24, 2013. Prof. Raphael Haftka coordinates the organizing committee.

2. Young Researcher ISSMO/ Springer Prize:

The recipient of the ISSMO/Springer Prize 2011 is Mr. Aleksey Pichugin, from Brunel University, Uxbridge, UK with the work “Michell structure for a uniform load over multiple spans” by A. V. Pichugin, A. Tyas and M. Gilbert.

The award ceremony will be held at the next WCSMO to be held in Florida, USA, 2013.

3. ISSMO endorsed the following international scientific meetings during 2011:

3.1. Advances in Simulation-Driven Optimization and Modeling (ASDOM), Reykjavik, Iceland, August 2011

3.2. 37th Design Automation Conference (DAC)-ASME, Washington D.C, USA, August 2011

4. ISSMO will endorse the following international scientific meetings during 2012:

4.1. CJK-OSM7, Huangshan, China, June 18-21, 2012

4.2. CISM Advanced Course in Topology Optimization, Udine, Italy, June 2012

4.3. Engopt 2012, Rio de Janeiro, July 2012

4.4. ICTAM 2012 Pre-Nominated Session SM15 - Structural Optimization, Beijing, China, August 2012.

Please consult the website <http://www.issmo.net> for more information about ISSMO.

Report composed by H. C. Rodrigues

LACCOTAM (Latin American & Caribbean Congress of Theoretical and Applied Mechanics)

Preparatory work continued for the Second Latin American & Caribbean Congress of Theoretical and Applied Mechanics, which is scheduled to take place in Caracas from 24 to 26 September 2012.

Please consult the website

<http://eventos.saber.ula.ve/eventos/conferenceDisplay.py?confId=203>

for more information.

Report composed by H. Ramkissoon

Reports on ICSU and its Scientific Committees

ICSU (International Council for Science)

30th General Assembly of ICSU

The ICSU General Assembly took place on 27-30 September 2011, at the Food and Agriculture Organisation in Rome. Tuesday 27 September was taken up with the Union Members' Forum, while the full GA, involving all the national members as well as the Unions' representatives, occupied the following three days. The International Council for Scientific Unions was founded in 1931 as an organisation linking national academies of science with the scientific unions; in 1998 it was renamed as the International Council for Science.

Most of the Union Members' Forum consisted of presentations of items that would be discussed at the full GA, in order to seek some coherent scientific views. The topics covered were: Urban Health (or, to give it its full title, "Health and wellbeing in the changing urban environment: a systems analysis approach"); Earth System Research for the Global Sustainability Initiative; and Energy. These are all areas in which many national and international bodies, including ICSU's relatively new regional offices, have expressed opinions and launched programmes.

The remainder of the Unions' Forum was taken up with business:

- A discussion of weighted voting in the GA, for financial matters only (see below). The Unions were almost unanimously in favour of weighted voting, since that is how they run their own GAs, as IUTAM does.
- A discussion of how unions could become more involved in ICSU committees and other affairs.
- A report on the ICSU Grants Programme. This has become much smaller since 2006, when US and UNESCO financial support was withdrawn. Since 2008 the programme has offered ten grants of up to EUR30K each year – but the budget is underspent: not enough proposals are submitted.
- Voting to reduce the number of Union nominations for ICSU Executive Board Members to eight, two from each 'cluster' of scientific unions.

The full GA was mostly taken up with reports on particular ICSU initiatives and discussion of them. A number of genuine questions or novel points were also raised. Here is a list of topics:

- Implementation of the new ICSU Strategic Plan for 2012-2017 (see <http://www.icsu.org/publications/reports-and-reviews/icsu-strategic-plan-2012->

2017), which is divided into three main sections: International Research Collaboration, Science for Policy, Universality of Science.

- Earth System Sustainability Initiative
- Health and Wellbeing in the Changing Urban Environment
- Polar Science
- ICSU involvement in observing systems
- Integrated Research in Disaster Risk (IRDR)
- Programme on Ecosystem Change and Society
- Science for Policy – (i) Commission on Sustainable Development and UN Conference on Sustainable Development (called Rio + 20), and (ii) Intergovernmental science-policy Platform for Biodiversity and Ecosystem Services
- Strategic Coordination for Information and Data
- World Data System

In addition to the above, there was a discussion on the Universality of Science – one of ICSU’s core concerns. The Committee on Freedom and Responsibility in the conduct of Science had proposed an amendment to ICSU’s statute 5, the ‘Principle of Universality’, to ensure that it emphasises responsibilities as much as freedoms. In the end the following revised statute was agreed:

“The Principle of Universality (freedom and responsibility) of Science: the free and responsible practice of science is fundamental to scientific advancement and human and environmental well-being. Such practice, in all its aspects, requires freedom of movement, association, expression and communication for scientists, as well as equitable access to data, information, and other resources for research. It requires responsibility at all levels to carry out and communicate scientific work with integrity, respect, fairness, trustworthiness, and transparency, recognising its benefits and possible harms.”

In advocating the free and responsible practice of science, ICSU promotes equitable opportunities for access to science and its benefits, and opposes discrimination based on such factors as ethnic origin, religion, citizenship, language, political or other opinion, sex, gender identity, sexual orientation, disability, or age.”

There was also discussion and a vote on weighted voting. A number of (smaller) countries were against it, believing in “One country, one vote”, but in the end the GA agreed to adopt weighted voting on financial issues only (i.e. approval of annual audited accounts, level of dues, and overall budgets) and to amend Statute 22a accordingly (see below). It was pointed out that “One person, one vote” should favour a weighting in proportion to the population of active scientists, on the basis of which the dues schedule has been established.

Statute 22. a) “In order to ensure equality of votes of the two categories of membership in the General Assembly, each National Scientific Member shall have one vote, and each Scientific Union Member that number of votes which is equal to the number of National

Scientific Members divided by the number of Scientific Union Members, except in votes concerning finance, in which case voting shall be weighted for all Members.”

Elections were held for new (and continuing) officers and Executive Board members. The new President-elect of ICSU, who will take over at the end of the next GA in 2014, is Gordon McBean, a Canadian meteorologist and climate change expert. He has been involved with ICSU for many years.

The business of the GA was enlivened by two scientific lectures and an address by the incoming President of ICSU, Professor Yuan Tseh Lee, Chemistry Nobel Laureate from Taiwan. In addition, unions had been invited to put up posters in the lobby, and were given two minutes each to outline their field and activities, in groups of five (“Poster Expresso”), scattered throughout the three days.

Report composed by Tim Pedley, President of IUTAM

ENHANS

The ENHANS is a project of the International Council for Science (ICSU) led by the International Union of Geodesy and Geophysics. ENHANS supporting partners are the American Geophysical Union (AGU), the International Geographical Union (IGU), the International Society for Photogrammetry and Remote Sensing (ISPRS), the International Union of Geological Sciences (IUGS), the International Union of Theoretical and Applied Mechanics (IUTAM), the Scientific Committee of the Program “Integrated Research on Disaster Risk” (IRDR), and the Global Ocean Observing System (GOOS) of IOC-UNESCO. The ICSU Regional Offices for Africa (ROA), Asia & the Pacific (ROAP), and Latin America and the Caribbean (ROLAC) are involved in the relevant parts of the project providing links to the regions.

The principal goals of the ENHANS project are (i) to improve understanding of critical phenomena associated with extreme natural events and to analyze impacts of the natural hazards on sustainable development of society; (ii) to promote studies on the prediction of extreme events reducing predictive uncertainty and on natural hazards mitigation; to bring the issues into political and economical policies; (iii) to disseminate knowledge and data on natural hazards for the advancement of research and education in general and especially in developing countries; and (iv) to establish links and networks with the international organizations involved in research on extreme natural hazards and their societal implications setting up a consortium of experts of ICSU Unions and several major intergovernmental and multi-national organizations involved in the project. The goals of ENHANS will be achieved via scientific meetings and open forums bringing together research experts, decision makers, and disaster management, insurance agency and mass media practitioners. The project will place a special emphasis on the importance of research on extreme natural hazards and disaster risk mitigation in the

most vulnerable regions of the world, particularly in Latin America and the Caribbean, in Africa, in the Middle East, in Asia, and the Pacific region.

IUTAM was represented in several ENHANS events in 2011: an ENHANS workshop in Pretoria, South Africa from 17 to 20 January 2011 (Keith Moffatt was the IUTAM representative) and special events during the General Assembly of the International Union of Geodesy and Geophysics in Melbourne, Australia from 29 June to 2 July 2011 (Paul Linden was the IUTAM representative).

ENHANS workshop in Pretoria, South Africa

The ENHANS International Workshop “Extreme Natural Hazards and Disaster Risk in Africa” (17-20 January 2011) provided an opportunity for the research community of the African countries and international experts to discuss and analyze major topics related to extreme natural events and disaster risk. The workshop served as a platform to establish links and networks between African experts with relevant international organizations.

The workshop was hosted by the Aon Benfield Natural Hazard Centre, University of Pretoria, and was based on invited presentations by African and foreign experts in natural hazards and disaster risk analysis. The Workshop’s scientific program can be found at the workshop’s web-page: <http://www.technoscene.co.za/hazardsws>.

The Workshop’s participants adopted some recommendation for governments and funding institutions in cooperation with the relevant ICSU bodies, United Nations agencies and other international entities.

Report composed by Alik Ismail-Zadeh, ENHANS project coordinator

ENHANS events in Melbourne, Australia

The following ENHANS events took place on 29 June – 2 July 2011 at the XXV General Assembly of the International Union of Geodesy and Geophysics in Melbourne, Australia:

Union Symposium “*Grand Challenges in Natural Hazards Research and Risk Analysis*”

Union Symposium “*Earth on the Edge – Recent Pacific Rim Disasters*”

Open Forum “*Natural Hazards: From Risk to Opportunity by Partnership of Science and Society*”

These events were co-organized by IUGG Commission on Geophysical Risk and Sustainability (GeoRisk Commission) and ENHANS Project, and co-sponsored by AGU, GOOS, ICSU, IGU, IRDR, ISPRS, IUGG, IUGS, IUTAM, UNESCO, UNISDR.

The Program “Integrated Research on Disaster Risk (IRDR)” co-sponsored by ICSU, ISSC and UNISDR started in 2009 aiming at curbing natural disaster losses by knowledge-based decision-making. It is only possible through the partnership between science and society by integrating natural and social sciences, engineering, economic and industrial activities, public administration, policy making, etc. The Symposium addressed major challenges in natural hazards research, risk analysis and ways for solutions. The Open Forum discussed how such integration is realized and natural disaster risk can be converted to opportunity.

Co-Conveners: Kuniyoshi Takeuchi (Japan, President of the IUGG GeoRisk Commission and Vice Chair of IRDR) and Alik Ismail-Zadeh (Germany/Russia/France, Leader of the ENHANS project)

Co-Conveners: Tom Beer (Australia), David Boteler (Canada), Shigeko Haruyama (Japan), David Jackson (USA), Fumihiko Imamura (Japan), Vladimir Kossobokov (Russia), John LaBrecque (USA), Uri Shamir (Israel), Ramesh Singh (India), Gerd Tetzlaff (Germany).

SYMPOSIUM “GRAND CHALLENGES IN NATURAL HAZARDS RESEARCH AND RISK ANALYSIS”

Each year thousands of people across Asia and the Pacific region are killed and many more affected due to floods, storms, earthquakes, drought, volcanoes and other such hazards. Hazards are only potentially damaging and the disasters occur when they impact on vulnerable communities, which are highly concentrated in poorer countries with weaker governance. Dr. Gordon McBean (*Research Chair, the Institute of Catastrophic Loss Reduction of the University of Western Ontario, Canada, and Chair of the ICSU-ISSC/UNISDR Program “Integrated Research on Disaster Risk – IRDR”*) introduced the IRDR programme, which integrates research across hazards, natural, socio-economic, engineering and health sciences disciplines and geographical regions. The research will focus on the characterization of hazards, vulnerability and risk; effective decision making; and knowledge based actions leading to major reductions in future impacts and loss of lives. “Forensic Investigations that will delve in greater depth into the root causes of disasters is one initial thrust. The second, Risk Interpretation and Action, will examine how human actions, conditions, decisions and culture, and how people choose, or feel they have no choice but, to live and work in areas at higher risk, change vulnerabilities and contribute to disasters”, according to Dr. McBean.

“Effective disaster risk reduction is founded on knowledge of the underlying risk”, mentioned Dr. John Schneider (*Group Leader “Risk and Impact Analysis Group” of Geoscience Australia*). While methods and tools for assessing risk from specific hazards

or to individual assets are generally well developed, our ability to holistically assess risk to a community across a range of hazards and elements at risk remains limited. Developing a holistic view of risk requires interdisciplinary collaboration amongst a wide range of hazard scientists, engineers and social scientists, as well as engagement of a range of stakeholders. Dr. Schneider presented some of the challenges sampled from a range of applications addressing earthquake, tsunami, volcano, severe wind, flood, and sea-level rise from projects in Australia, Indonesia and the Philippines.

Dr. Soroosh Sorooshian (*Director of the Center for Hydrometeorology & Remote Sensing and Distinguished Professor of the University of California at Irvine, USA*) considers that capturing the spatial and temporal distribution precipitation in fine scales is critical to hydrologic, climatic, and ecological applications. Recent development of satellite remote sensing techniques provides a unique opportunity for better observation of precipitation from space and overcome some of the limitations of ground measurement. Dr. Sorooshian reviewed some of the recent developments in the development of satellite-based precipitation observation methodologies.

“High-resolution models are vital to project reliable and possible future changes in weather extremes such as tropical cyclone and heavy rainfall”, mentioned Dr. Akio Kitoh (*Director, Climate Research Department, Meteorological Research Institute at Tsukuba, and Professor of Kyoto University, Japan*). Unprecedented super high-resolution atmospheric models are being used for global warming projection. Projections on tropical cyclones reveal marked future increases in precipitation and surface wind velocity fields at inner-core region within 150 km from the tropical cyclone center, implying increase in disaster risk induced by tropical cyclones in the future. Information on the uncertainty of future projection is significant for any decision-making processes and for various application studies on disaster prevention.

Dr. Paul Linden (*Professor at the University of Cambridge, UK and ENHANS representative of IUTAM*) presented an ongoing scientific and engineering project to prevent flooding in Venice. The construction of the flood protection gates at the entrance to the Venice Lagoon and due to be commissioned in 2014 provides an unprecedented opportunity to manage the lagoon and its interaction with the Adriatic Sea. It also raises important questions about the scientific monitoring and decisionmaking process to enable the sustainable development of the lagoon and the historic city of Venice. Dr. Linden discussed the past and future monitoring and assessment of the physical and ecological states of the Venice Lagoon and described proposed structures for its management.

In the book “The Handbook of Disaster and Emergency Policies and Institutions” by Handmer and Dovers (Earthscan, 2007), a lack of previous focus on the policy and institutional aspects of disasters and emergencies was identified. Dr. Stephen Dovers (*Professor and Director of the Fenner School of Environment and Society, Australian National University in Canberra and ENHANS representative of the International Geographical Union*) discussed the increasing emergence of climate change as a major

influence on thinking about disasters, and the lessons from recent events such as floods and cyclones in Australia. Dr. Dovers emphasized particularly the degree to which existing agendas of policy and institutional reform, and existing institutional capacities provide a basis for coping with what is likely to be a future punctuated by more and more serious disasters and emergencies.

Dr. John Eichelberger (*Program Coordinator for the Volcano Hazards Program at the U.S. Geological Survey – USGS, and ENHANS representative of the American Geophysical Union*) discussed how several observatories in the Pacific region monitor volcanoes and warn of impending or ongoing eruptions. Much of the real-time monitoring data are available to the public through observatory websites, and citizen reports on volcanic activity and ash falls are solicited. Close linkage between Russian and the Alaska observatories tracks ash threatening North Pacific air routes. A challenge is to maximize the societal benefit from this expanded hazard community. Indeed, accessibility of real-time data makes the concept of cloistered observatories outmoded. Observatories will still be dedicated to monitoring a limited number of volcanoes for their neighboring populations and will be the sole authoritative voice for hazard warnings, but must also become nodes for data and knowledge exchange for the larger scientific community. The Eyjafjallajökull eruption showed that such networking should be international in scope.

The recent Indian Ocean Tsunami (26 December 2004) was the most devastating in the world over the past 40 years. Dr. Harsh Gupta (*Panikkar Professor at the National Geophysical Research Institute, Hyderabad, India; President of the Asian Oceanic Geoscience Society, and the ENHANS representative of the ICSU Regional Office for Asia and the Pacific*) discussed how India planned for development of an integrated mitigation system for the tsunami and storm surges in the northern part of Indian Ocean region with an ultimate goal to save lives and property. The design of the system was based on end-to-end principle, involving (i) mean real time estimate of earthquake parameters, (ii) assessment whether a tsunami has been indeed generated through deployment of ocean bottom pressure sensors and tide gauges, (iii) numerical modeling for tsunami, storm surges with all associated data inputs, (iv) generation of coastal inundation and vulnerability maps, (v) development of Tsunami Warning Centre in Hyderabad, and (vi) capacity building, education, and training for all stakeholders.

“A proper management increases the situational awareness after a disaster happened, gives a better overview of available data (especially dynamic data), facilitates the access to a desired piece of information, and contributes to automatic data processing. Consequently the information can be used more efficiently in the decision-making process”, as Dr. Sisi Zlatanova (*Professor, Delft University of Technology, The Netherlands and ENHANS representative of the International Society of Photogrammetry and Remote Sensing*) considers. Well-structured data can support cost-benefit analysis in post-disaster period, provide strong foundation for effective mitigation measures and improve the preparedness. The variety of approaches reveals the complexity of the problem. Emergency response is very much nationally and even

locally (district) organized. Furthermore each country is prone to a specific set of hazards and organizes its management procedures according to the recognized vulnerability. Another complicating factor is the disaster type, which may require different data sets and procedures for management. Dr. Zlatanova analyzed the challenges in data management and presented some dynamic data models developed recently.

UNION SYMPOSIUM: EARTH ON THE EDGE - RECENT PACIFIC RIM DISASTERS

The symposium was dedicated to the recent disasters in the Pacific Rim region.

Dr. Kuniyoshi Takeuchi (*Director of the International Centre for Water Hazard and Risk Management, Tsukuba, Japan*) introduced the total picture of the Great East Japan Earthquake and Tsunami with the latest figures of damages. He said that it was a concatenation of events that occurred from the earthquake to the tsunami and from the tsunami to nuclear meltdown. Impacts spread through supply chain of production materials from local to nation and from nation to the outer world. He also introduced the newly enacted Reconstruction Law and its basic policy. He emphasized that there should not be "beyond expectation" in disaster risk management however unexpected hazards are.

The Great Off Tohoku earthquake that occurred on 11 March 2011 off the Pacific coast of northern Honshu (Tohoku) was the latest in size (magnitude 9.0) and caused the worst tsunami disaster in Japan's history. Dr. Kenji Satake (*Professor at the Earthquake Research Institute, University of Tokyo, Japan*) mentioned that this giant earthquake was a plate boundary rupture along the Japan trench, where interplate earthquakes ($M < 8$) occurred with a few decades interval and the probability of next one in the next 30 years was forecasted as $>80\%$. The March earthquake was however much larger than forecast. The GPS network recorded large co-seismic displacements ($> 5\text{m}$ horizontal and $> 1\text{m}$ subsidence), and the tsunami inundation was several kilometers. The fault rupture was about 400 km long, while the aftershocks extended nearly 500 km long, including three $M > 7$ events within an hour of the main shock. Similarly large earthquake and tsunami in AD 869 (called the Jogan earthquake) was recorded in a Japanese historical document, which mentioned a thousand casualties and kilometers of tsunami inundation. Recent studies have clarified that the Jogan and older tsunami deposits were distributed several kilometers from the present coast with recurrence intervals of several hundreds to thousand years.

Dr. Fumi Imamura (*Professor at the Disaster Control Research Center, Tohoku University, Japan*) mentioned that the Great East Japan earthquake took more than 27,000 lives. Several types of tsunami impact are reported, among them, inundation in a large area, destructive force destroying houses, buildings, infrastructures, roads, and railways, and change of topography due to the erosion and deposition. Although the observation system of tsunami was heavily damaged along the coast, some available data were recorded by the tidal gauges, GPS buoy one, and deep sea pressure sensors. The

extent of affected area is quite large and still limitations and difficulties of ground survey exist. Dr. Imamura reported the results of field surveys as well as satellite image analysis with ground truth data, to obtain the data of the tsunami and its disaster, and identify extent of tsunami inundation and land use change. The distribution of tsunami run-up heights measured along the coast were ranging from 7 to 15 m in Sendai and Fukushima with a simple beach geometry and 10 to 30 m in Sanriku with the complex geometry of the Rias coast.

Dr. Susan Kiefer (*Professor of the University of Illinois, USA*) discussed how the tsunami waves changed their dynamic features. As the tsunami approached and then flowed onto the shore of northern Honshu, the character of the waves changed several times. Deep-water waves changed to multiple shallow water waves as the tsunami approached shore. When these waves encountered coastal cities, they broke into individual hydraulic streams channelized by the infrastructure. From videos posted on the WWW, Dr. Keifer with her group constructed hydrographs for sites in Kesenuma, Oirase, Sendai, and Kamaishi.

Finally, Dr. Kojiro Irikura (*Professor of the Aichi Institute of Technology, Japan*) discussed how the huge tsunami generated by the Great East Japan earthquake led to the accidents at the nuclear reactors. When the earthquake happened, all of reactor-units at four nearby plants were automatically shut down and began to be cooled by cooling systems until they were attacked by big tsunami waves. All units at the Onagawa and the Tokai-No. 2 Nuclear Power Plants got out of troubles because the heights of tsunami waves were lower than the altitudes of the plant sites. However, the Fukushima-No.1 and the Fukushima-No.2 plants were damaged by big tsunami waves, because the tsunami heights were much higher than the altitudes of the plant sites. At the Fukushima No.1 plant, external electric powers were stopped, watertanks were broken, and further all of the independents power generation systems were broken. At the Fukushima No.2 Plant, some of the independents power generation systems were not broken because they were put at a little high ground, then the cooling systems at the Fukushima No. 2 Plant were soon recovered. The severe accidents at the Fukushima No. 1 Plant were caused to deficiency of multifaceted protective mechanisms, not only the tsunami.

The deadly and damaging Christchurch Earthquake of 22 February 2011 is part of the Canterbury earthquake sequence started by the Mw 7.1 Darfield Earthquake in September 2010. Dr. Kevin Furlong (*Professor at Penn State, USA*) showed that this sequence occurred on previously unrecognized fault(s) and significantly distant from the main components of the plate boundary system through South Island, New Zealand. The initial rupture of the September event and subsequent aftershocks have delineated a linear (nearly east-west in orientation) trend extending over 80 km from the foothills of the Southern Alps to the Pacific coast, east of the city of Christchurch. Understanding the relationships among fault segments, regional geologic structure, and crustal stresses associated with regional plate interactions is key to placing these events into a context that allows us to apply lesson learned elsewhere.

Dr. Neville Nicholls (*Professor at Monash University, Melbourne, Australia*) discussed the role of the climate and weather in the January 2011 Brisbane floods, and the potential role of climate/weather forecasts in avoiding or reducing flood damage. Since the last major floods in the Brisbane River (1974) there have been major advances in the detail, timeliness, delivery, and quality of weather and climate predictions on all these time-scales. On some time scales weather and climate forecasts were not even available for previous floods. The skill of forecasts on the synoptic time-scale has improved dramatically over the past few decades. The models used to make projections on climate change timescales have become more complex than those available in the early 1970s, and the likely consequences of global warming are now better appreciated.

OPEN FORUM: NATURAL HAZARDS: FROM RISK TO OPPORTUNITY BY PARTNERSHIP OF SCIENCE AND SOCIETY

The Open Forum attracted attention from not only the participants of the IUGG General Assembly but also representatives of media. Dr. A. Ismail-Zadeh and Dr. Kuni Takeuchi opened the forum. Dr. Ismail-Zadeh introduced the project “Extreme Natural Events and Societal Implications” as trans-disciplinary and illustrating international efforts of natural and social scientists, engineers, insurance industry, international organizations, policy makers and media to deal with extreme events and disaster risks.

Report composed by Alik Ismail-Zadeh, ENHANS project coordinator

COSPAR (Committee on Space Research)

No report has been submitted by COSPAR.

SCOPE (Scientific Committee on Problems of the Environment)

No report has been submitted by SCOPE.

SCOR (Scientific Committee on Oceanic Research)

1. Background

Recognition that scientific questions about the ocean often require an interdisciplinary approach, led the International Council for Science (ICSU) to form the Scientific committee on Oceanic Research (SCOR) in 1957. SCOR activities focus on promoting international cooperation in planning and conducting oceanographic research, and solving methodological and conceptual problems that hinder research. Scientists from thirty-six nations participate in SCOR working

groups and steering committees. Approximately 250 scientists participate in SCOR activities on a voluntary basis at any given time. SCOR has been instrumental in the planning and coordination of large-scale ocean research projects for long-term complex activities. SCOR provides a mechanism to bring together international scientists for this purpose.

2. **International Quiet Ocean Experiment**
SCOR and the Partnership for Observation of the Global Oceans received funding from the Alfred P. Sloan Foundation held a workshop in October 2010 for exploring the idea of an International Quiet Ocean Experiment. Workshop participants from the scientific community, industry, and several navies discussed the current knowledge of sound in the ocean, its effects on marine organisms, and in particular, what could be learned if areas of the ocean could be quieted by ceasing some or all human-generation of sound for a limited period, and other issues related to comparative studies of sound. Meeting participants concluded that there is a need for large-scale international observations and experiments in relation to sound in the ocean. An open science meeting on the topic will be planned for late 2011.
3. **SCOR Working Group 136 on Climatic Importance of the Greater Agulhas System**
This group published a description of their work in EOS and has begun planning a workshop in Africa that will focus on capacity building and will bring together scientists from east and southern Africa who are interested in the dynamics of the Agulhas current and how it affects regional and global science .
4. **SCOR Annual Meetings**
2011 – The 2011 Executive committee meeting was hosted by the Finnish SCOR Committee in Helsinki, Finland on September 12 – 15.
2012 – The 2012 SCOR General Meeting will be held in Halifax, Nova Scotia, Canada.
5. For additional information about SCOR activities, please enter to the SCOR web site: <http://www.scor-int.org>

Report composed by Michael Stiassnie

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. XII 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 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 sur proposition formulée par le Bureau (cf. Art. XI 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.

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. XI);
- c) des membres cooptés par l'Assemblée Générale de l'Union;

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. X);
- ii) le Secrétaire du Comité de Congrès (cf. art. XII);
- iii) les présidents des «Symposia Panels»;
- iv) les présidents des «Working Parties»;
- v) des représentants des « organisations associées adhérentes » (cf. art. IX)
- vi) des représentants des pays candidats à l'adhésion;
- vii) 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 27 août 2008 à Adélaïde, Australie*

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 Adélaïde, 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 Adélaïde, 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 XI) 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 qui ont été membres de l'Assemblée Générale à un moment de la période précédant de quatre 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 premier 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 2 Septembre 1990 à Vienne, Autriche*

XIII L'Assemblée Générale désigne un Comité permanent des Congrès chargé d'organiser à intervalles réguliers les Congrès Internationaux de Mécanique Théorique et Appliquée (ICTAM).

- a) Le Président de l'Union préside aussi ce Comité des Congrès.
- b) Les Membres de ce Comité sont nommés par l'Assemblée Générale; ce sont des scientifiques actifs en mécanique théorique ou appliquée, n'appartenant pas nécessairement à l'Assemblée Générale.
- c) Le Comité des Congrès nomme un Secrétaire, sans précision de durée.
- d) Les règles de fonctionnement du Comité des Congrès sont soumises à l'approbation de l'Assemblée Générale.

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 Adélaïde, 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 Adélaïde, 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 au moins une fois lors de chaque Congrès.
2. Le Comité des Congrès doit nommer un Comité Exécutif chargé de prendre en son nom 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 Comité Exécutif comprend le président, le secrétaire du Comité des Congrès, et un ou plusieurs membres désignés par le comité des Congrès.
3. L'organisation effective d'un Congrès est confiée à un Comité local d'Organisation, élu par le pays ou l'organisation qui invite, et ce Comité est également responsable de la publication des Comptes rendus du Congrès. Le Comité d'Organisation fera son rapport au Comité des Congrès soit au cours du Congrès qu'il organise, soit avant, s'il le juge préférable.
4. Le Comité d'Organisation devra obtenir l'approbation du Comité des Congrès (normalement par l'intermédiaire du Comité Exécutif) pour toutes les questions relevant de la politique générale du Comité des Congrès, en particulier pour celles qui concernent:

- 4.1. le but du Congrès;
 - 4.2. la sélection des communications pour le Congrès;
 - 4.3. le choix des conférences générales pour le Congrès;
 - 4.4. la désignation des présidents de sessions du Congrès;
 - 4.5. les principes généraux régissant les arrangements financiers du Congrès.
5. Le Comité d'Organisation percevra, de tous les membres du Congrès, une contribution (dont le montant sera proposé par le Comité du Congrès et approuvé par le Bureau) afin de couvrir les dépenses administratives du Comité du Congrès. Ces contributions seront reversées à l'IUTAM immédiatement après le Congrès.

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 droit 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 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.

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. 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) Secretary of the Congress Committee (Article XIII);
- iii) chairmen of the Symposia Panels;
- iv) chairmen of the Working Parties;
- v) representatives of adhering associated organisations (Article IX);
- vi) representatives of countries applying for membership;
- vii) representatives of committees and groups of scientists, if so decided by the General Assembly.

****) Article VI adopted by the General Assembly on August 27, 2008, in Adelaide (Australia)*

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 who shall have been members of the General Assembly at some time within the four 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 were 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 September 2, 1990, in Vienna (Austria)*

XIII. The General Assembly establishes a standing Congress Committee 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 President of the Congress Committee.

b) The members of the Congress Committee are appointed by the General Assembly as scientists active in theoretical or applied mechanics and need not be members of the General Assembly.

- c) The Congress Committee appoints a Secretary, without stated terms of office.
- d) The rules of procedure of the Congress Committee shall be approved by the General Assembly.

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 of IUTAM

1. The Congress Committee meets at least once at every Congress.
2. The Congress Committee may appoint an Executive Committee to take all necessary actions on its behalf in the period between two successive Congresses, and to report to it at its next meeting. The Executive Committee will consist of the president, the secretary and one or more members appointed by the Congress Committee.
3. The actual organization of a Congress is delegated to a local Organizing Committee, elected by the host-country or host-organization, which is also responsible for publication of its Proceedings. The Organizing Committee will report to the Congress Committee either during or, if it sees fit, before the Congress which it organizes.
4. The Organizing Committee will obtain the approval of the Congress Committee (normally through the Executive Committee) with regard to all matters affecting the general policy of the Congress Committee, in particular with regard to:
 - 4.1. the scope of the Congress;
 - 4.2. the screening of papers of the Congress;
 - 4.3. the selection of general lectures for the Congress;
 - 4.4. the appointment of chairmen of sessions of the Congress;
 - 4.5. the broad principles regarding financial arrangements for the Congress.
5. The Organizing Committee will levy a fee (the level to be recommended by the Congress Committee and approved by the Bureau) for administrative expenses of the Congress Committee, from all Congress members. This fee will be paid over to IUTAM after the Congress.

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 provided for in Article VI(c) of the Statutes.
2. Proposals, by members of the General Assembly with voting rights, for Members-at-Large must be received by the Bureau at least three months before the meeting of the

General Assembly 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 General Assembly such proposals as it deems will have at least a reasonable support by the General Assembly, provided however that the total number of Members-at-Large is not to exceed approximately one eighth ($1/8$) of the total General Assembly membership with voting rights. Such proposals will be circulated to all members of the General Assembly 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 General Assembly before its second session.
5. The General Assembly will vote on those candidates mentioned in the proposals of paragraphs 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. These Annual Reports are preserved at the IUTAM Archive at CISM, Udine, Italy.

The IUTAM Annual Reports over the last five years are available upon request from the IUTAM Secretariat and as pdf file 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 last IUTAM Newsletter is available from the IUTAM Secretariat. Pdf versions of IUTAM Newsletters are available from the IUTAM website.

c) Proceedings of IUTAM Symposia

Since 2011, the official publisher for proceedings of IUTAM Symposia is Elsevier, under the newly created 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)

These are only available by direct ordering from the publisher.

e) Publications on the history of IUTAM

Proceedings of IUTAM Symposia

The Proceedings of IUTAM Symposia published since 1998 are listed below. The names of the editors and of the publisher are given in every case. A complete listing of all published Proceedings can be found at the IUTAM website <http://www.iutam.net> or <http://www.iutam.org>.

1998

- 98-1 *IUTAM Symposium on Three-Dimensional Aspects of Air-Sea Interaction* (Nice, France, 17-21 May 1998)
The Proceedings of the Symposium, edited by F. Dias and C. Kharif, have been published as a special issue of the "European Journal of Mechanics B / Fluids", Vol. 18, No. 3 (1999)
- 98-2 *IUTAM Symposium on Synthesis in Bio Solid Mechanics* (Lyngby, Denmark, 24-27 May 1998).
The Proceedings of the Symposium, edited by Pauli Pedersen and Martin P. Bendsøe, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1999. ISBN 0-7923-5615-2.
- 98-3 *IUTAM/IUGG Symposium on Developments in Geophysical Turbulence* (Boulder, USA, 16-19 June 1998).
The Proceedings of the Symposium, edited by R.M. Kerr and Y. Kimura, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000 ISBN 0-7923-6673-5.
- 98-4 *IUTAM Symposium on Viscoelastic Fluid Mechanics* (Stanford, USA, 21-25 June 1998).
A Report on this Symposium by E.S.G. Shaqfeh and a collection of selected papers have been published in the "Journal of Non-Newtonian Fluid Mechanics", Vol. 82 (1999), pp. 127-457.
- 98-5 *IUTAM Symposium on Unilateral Multibody Contacts* (Munich, Germany, 3-7 August 1998).
The Proceedings of the Symposium, edited by F. Pfeiffer and Ch. Glocker, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1999. ISBN 0-7923-6030-3.
- 98-6 *IUTAM/IFTToMM Symposium on Synthesis of Nonlinear Dynamical Systems* (Riga, Latvia, 24-28 August 1998).
The Proceedings of the Symposium, edited by E. Lavendelis and M. Zakrzhevsky, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1999. ISBN 0-7923-6106-7.

- 98-7 *IUTAM Symposium on Advanced Optical Methods and Applications in Solid Mechanics*
(Poitiers, France, 31 August-4 September 1998).
The Proceedings of the Symposium, edited by A. Lagarde, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6604-2.
- 98-8 *IUTAM/IASS Symposium on Deployable Structures: Theory and Applications*
(Cambridge, UK, 6-9 September 1998).
The Proceedings of the Symposium, edited by S. Pellegrino and S.D. Guest, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6516-X.
- 98-9 *IUTAM Symposium on Mechanics of Passive and Active Flow Control*
(Göttingen, Germany, 7-11 September 1998).
The Proceedings of the Symposium, edited by G.E.A. Meier and P.R. Viswanath, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1999. ISBN 0-7923-5928-3.
- 1999**
- 99-1 *IUTAM Symposium on Nonlinearity and Stochastic Structural Dynamics*
(Madras, India, 4-8 January 1999).
The Proceedings of the Symposium, edited by S. Narayanan and R.N. Iyengar, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6733-2.
- 99-2 *IUTAM Symposium on Mechanical and Electromagnetic Waves in Structured Media*
(Sydney, NSW, Australia, 18-22 January 1999).
The Proceedings of the Symposium, edited by R.C. McPhedran, L.C. Botten and N.A. Nicorovici, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7038-4.
- 99-3 *IUTAM Symposium on Recent Developments in Nonlinear Oscillations of Mechanical Systems*
(Hanoi, Vietnam, 2-5 March 1999).
The Proceedings of the Symposium, edited by N. Van Dao and E.J. Kreuzer, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6470-8.

- 99-4 *IUTAM/IACM/IABEM Symposium on Advanced Mathematical and Computational Mechanics Aspects of the Boundary Element Method* (Cracow, Poland, 31 May-3 June 1999).
The Proceedings of the Symposium, edited by T. Burczynski, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7081-3.
- 99-5 *IUTAM Symposium on Segregation in Granular Flows* (Cape May, New Jersey, USA, 5-10 June 1999).
The Proceedings of the Symposium, edited by A.D. Rosato and D.L. Blackmore, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6547-X.
- 99-6 *IUTAM Symposium on Nonlinear Wave Behaviour in Multi Phase Flow* (Notre Dame, Indiana, USA, 7-9 July 1999)
The Proceedings of the Symposium edited by H.C. Chang, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6454-6.
- 99-7 *IUTAM Symposium on Theoretical and Numerical Methods in Continuum Mechanics of Porous Materials* (Stuttgart, Germany, 5-10 September 1999).
The Proceedings of the Symposium, edited by W. Ehlers, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-6766-9.
- 99-8 *IUTAM Symposium on Laminar-Turbulent Transition* (Sedona, Arizona, USA, 12-18 September 1999).
The Proceedings of the Symposium, edited by H. Fasel and W.S. Saric, have been published by Springer-Verlag, Berlin/Heideberg/New York, 2000. ISBN 3-540-67947-2.
- 99-9 *IUTAM Symposium on Geometry and Statistics of Turbulence* (Hayama, Japan, 1-5 November 1999).
The Proceedings of the Symposium edited by T. Kambe, T. Nakano and T. Miyauchi, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-6711-1.
- 2000**
- 00-1 *IUTAM Symposium on Creep in Structures* (Nagoa, Japan, 3-7 April 2000).
The Proceedings of the Symposium, edited by S. Murakami and N. Ohno, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2000. ISBN 0-7923-6737-5.

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- 00-2 *IUTAM Symposium on Bluff Body Wakes and Vortex-induced Vibration*
(Marseille, France, 13-16 June 2000).
The Proceedings of the Symposium edited by T. Leweke, P.W. Bearman and C.H.K. Williamson, have been published by Academic Press in the Journal of Fluids and Structures, Special Issue on Bluff Body Wakes and Vortex-Induced Vibrations, London, 2001. ISSN 0889-9746, Vol. 15, nos. 3/4.
- 00-2a *IUTAM Symposium on Scaling Laws in Ice Mechanics and Ice Dynamics*
(Fairbanks, Alaska, USA, 13-16 June 2000).
The Proceedings of the Symposium, edited by J.P. Dempsey and H.H. Shen, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 1-4020-0171-1.
- 00-3 *IUTAM Symposium on Mechanical Waves for Composite Structures Characterization*
(Chania, Crete, Greece, 14-17 June 2000).
The Proceedings of the Symposium, edited by D.A. Sotiropoulos, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7164-X.
- 00-4 *IUTAM Symposium on Advances in Mathematical Modelling of Atmosphere and Ocean Dynamics*
(Limerick, Ireland, 2-7 July 2000).
The Proceedings of the Symposium, edited by P.F. Hodnett, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7075-9.
- 00-5 *IUTAM Symposium on Free Surface Flows*
(Birmingham, United Kingdom, 10-14 July 2000).
The Proceedings of the Symposium, edited by A.C. King and Y.D. Shikhmurzaev, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-7085-6.
- 00-6 *IUTAM Symposium on Diffraction and Scattering in Fluid Mechanics and Elasticity*
(Manchester, England, 17-20 July 2000).
The Proceedings of the Symposium, edited by I.D. Abrahams, P.A. Martin and M.J. Simon, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002. ISBN 1-4020-0590-3.

- 00-7 *IUTAM Symposium on Field Analyses for Determination of Material Parameters-Experimental and Numerical Aspects* (Kiruna, Sweden, 31 July-4 August 2000).
The Proceedings of the Symposium, edited by P. Stahle and K.G. Sundin, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1283-7.
- 00-8 *IUTAM Symposium on Smart Structures and Structronic Systems* (Magdeburg, Germany, 26-29 September 2000).
The Proceedings of the Symposium, edited by U. Gabbert and H.S. Tzou, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2001. ISBN 0-7923-6968-8.
- 00-9 *IUTAM Symposium on Designing for Quietness* (Bangalore, India, 12-14 December 2000).
The Proceedings of the Symposium, edited by M.L. Munjal, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002. ISBN 1-4020-0765-5.
- 2001**
- 01-1 *IUTAM Symposium on Flow in Collapsible Tubes and Past Other Highly Compliant Boundaries* (Warwick, Coventry, March 26-30, 2001).
The Proceedings of the Symposium, edited by P.W. Carpenter and T.J. Pedley, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1161-X.
- 01-2 *IUTAM Symposium on Material Instabilities and the Effect of Microstructure* (Austin, Texas, USA, 7-11 May 2001).
The Proceedings of the Symposium, edited by S. Kyriakides and N. Triantafyllidis, have been published by Elsevier as a special issue of the International Journal of Solids and Structures, Volume 39, Issues 13-14, 2002.
- 01-3 *IUTAM Symposium on Turbulent Mixing and Combustion* (Kingston, Ontario, Canada, 3-6 June 2001).
The Proceedings of the Symposium, edited by A. Pollard and S. Candel, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002. ISBN 1-4020-0747-7.

- 01-4 *IUTAM Symposium on Micromechanics of Martensitic Phase Transformation in Solids*
(Hong Kong, 11-15 June 2001).
The Proceedings of the Symposium, edited by Q.P. Sun, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002.
ISBN 1-4020-0741-8
- 01-5 *IUTAM Symposium on Analytical and Computational Fracture Mechanics of Non-Homogeneous Materials*
(Cardiff, England, 18-22 June 2001).
The Proceedings of the Symposium, edited by B.L. Karahaloo, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002.
ISBN 1-4020-0510-5
- 01-6 *IUTAM Symposium on Computational Mechanics of Solid Materials at Large Strains*
(Stuttgart, Germany, 20-24 August 2001).
The Proceedings of the Symposium, edited by C. Miehe, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003.
ISBN 1-4020-1170-9
- 01-7 *IUTAM Symposium on Tubes, Sheets and Singularities In Fluid Dynamics*
(Zakopane, Poland, 2-7 September 2001).
The Proceedings of the Symposium, edited by K. Bajaj and H.K. Moffatt, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002. ISBN 1-4020-0980-1

2002

- 02-1 *IUTAM Symposium on Micromechanics of Fluid Suspensions and Solid Composites*
(Austin, Texas, USA, 3-5 April 2002).
The Proceedings of the Symposium have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, in a special issue of the Philosophical Transactions: Mathematical, Physical & Engineering Sciences in May 2003
- 02-2 *IUTAM Symposium on Unsteady Separated Flows*
(Toulouse, France, 8-12 April 2002).
The Proceedings of the Symposium edited by M. Braza, Ch. Hirsch and F. Hussain, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, in a special issue of Flow, Turbulence and Combustion, Volume 71, Nos 1-4, 2003. ISSN 1386-6184.

- 02-3 *IUTAM Symposium on Dynamics of Advanced Materials and Smart Structures* (Yamagata, Japan, 20-24 May 2002).
The Proceedings of the Symposium edited by K. Watanabe and F. Ziegler, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1061-3.
- 02-4 *IUTAM Symposium on Asymptotics, Singularities and Homogenisation in Problems of Mechanics* (Liverpool, UK, 8-11 July 2002).
The Proceedings of the Symposium edited by A.B. Movchan, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1780-4.
- 02-5 *IUTAM Symposium on Complementary, _Dual Variational Principles in Nonlinear Mechanics* (Shanghai, China, 13-16 August 2002).
The Proceedings of the Symposium edited by David Y. Gao have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, in 2004. ISBN 1-4020-7887-0 (HB) and ISBN 1-4020-7888-9 (E-book)
- 02-6 *IUTAM Symposium on Nonlinear Stochastic Systems* (Urbana-Champaign, Illinois, USA, 25-31 August 2002).
The Proceedings of the Symposium edited by N. Sri Namachchivaya and Y.K. Lin, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1471-6.
- 02-7 *IUTAM Symposium Transsonicum IV* (Göttingen, Germany, 02-06 September 2002).
The Proceedings of the Symposium edited by H. Sobieczky, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1608-5.
- 02-8 *IUTAM Symposium on Reynolds Number Scaling in Turbulent Flow* (Princeton, N.J. USA, 11-13 September 2002).
The Proceedings of the Symposium edited by A.J. Smits, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1775-8.
- 02-9 *IUTAM Symposium on Evolutionary Methods in Mechanics* (Cracow, Poland, 24-27 September 2002).
The Proceedings of the Symposium edited by Tadeusz Burczynski and Andrzej Osyczka have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, in 2004. ISBN 1-4020-2266-2 (HB) and ISBN 1-4020-2267-0 (E-book)

- 02-10 *IUTAM Symposium on Multiscale Modeling and Characterization of Elastic-Inelastic Behavior of Engineering Materials*
(Marrakech, Morocco, 20-25 October 2002).
The Proceedings of the Symposium edited by S. Ahzi, M. Charkaoui, M.A. Khaleel, H.M. Zbib, M.A. Zikry, and B. LaMatina, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003.
ISBN 1-4020-1861-4.
- 2003**
- 03-1 *IUTAM Symposium on Mechanics of Physicochemical and Electromechanical Interactions in Porous Media*
(Kerkrade, The Netherlands 18-23 May 2003).
The Proceedings of the Symposium edited by J.M. Huyghe, P.A.C. Raats and S.C. Cowin, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN: 978-1-4020-3864-8
- 03-2 *IUTAM Symposium on Integrated Modeling of Fully Coupled Fluid-Structure Interactions*
(Rutgers, N.J. USA 02-06 June 2003).
The Proceedings of the Symposium edited by Haym Benaroya and Thomothy Wei, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2003. ISBN 1-4020-1806-1.
- 03-3 *IUTAM Symposium on Chaotic Dynamics and Control of Systems and Processes in Mechanics*
(Rome, Italy, 08-13 June 2003).
The Proceedings of the Symposium edited by G. Rega and F. Vestroni have been published by Springer, Dordrecht, The Netherlands in 2005.
ISBN 1-4020-3267-6 (HB) and ISBN 1-4020-3268-4 (E-book)
- 03-4 *IUTAM Symposium on Mesoscopic Dynamics of Fracture Process and Materials Strength*
(Osaka, Japan, 06-11 July 2003).
The Proceedings of the Symposium edited by H. Kitagawa and Y. Shibutani, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 2004. ISBN 1-4020-2037-6 (HB) and ISBN 1-4020-2111-9 (e-book).

2004

- 04-1 *IUTAM Symposium on Size Effects on Material and Structural Behavior at Micron- and Nano-Scales*
(Hong Kong, China, 30 May-4 June, 2004)
The Proceedings of the Symposium edited by Q.P. Sun and P. Tong, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-4945-5
- 04-3 *IUTAM Symposium on Non-Uniqueness of Solutions to the Navier-Stokes equations and their Connection with Laminar-Turbulent Transition*
(Manchester, UK, 9-11 August, 2004)
The Proceedings of the Symposium edited by T. Mullin and R.R. Kerswell, have been published by Springer, Dordrecht, The Netherlands in 2005.
ISBN 1-4020-4048-2
- 04-4 *IUTAM Symposium on One Hundred Years of Boundary Layer Research*
(Göttingen, Germany, 12-14 August, 2004)
The Proceedings of the Symposium edited by G.E.A. Meier, K.R. Sreenivasan et.al, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-4149-7
- 04-5 *IUTAM Symposium on Elastohydrodynamics and Microelastohydrodynamics*
(Cardiff, UK, 1-3 September, 2004)
The Proceedings of the Symposium edited by R.W. Snidle and H.P. Evans, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-4532-8
- 04-6 *IUTAM Symposium on Mechanics and Reliability of Actuating Materials*
(Beijing, China, 1-3 September, 2004)
The Proceedings of the Symposium edited by W. Yang, have been published by Springer, Dordrecht, The Netherlands in 2005. ISBN 1-4020-4130-6
- 04-7 *IUTAM Symposium on Computational Approaches to Multiphase Flow*
(Argonne, Illinois, USA, 4-7 October, 2004)
The Proceedings of the Symposium edited by S. Balachandar and A. Prosperetti, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-4976-5
- 04-8 *IUTAM Symposium on Elementary Vortices and Coherent Structures: Significance in Turbulence Dynamics*
(Kyoto, Japan, 26-28 October, 2004)
The Proceedings of the Symposium edited by Kida, Shigea, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-4180-2

- 04-9 *IUTAM Symposium on Laminar-Turbulent Transition*
(Bangalore, India, 13-17 December, 2004)
The Proceedings of the Symposium edited by Govindarajan, Rama, have been published by Springer, Dordrecht, The Netherlands in 2006.
ISBN 1-4020-3459-8
- 2005**
- 05-1 *IUTAM Symposium on Multiscale Modelling of Damage and Fracture Processes in Composite Materials*
(Kazimierz Dolny, Poland 23-27 May, 2005).
The Proceedings of the Symposium edited by T. Sadowski, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2006.
ISBN 978-1-4020-4565-3.
- 05-2 *IUTAM Symposium on IUTAM Symposium on Mechanical Behavior and Micro-mechanics of Nanostructured Materials*
(Beijing, China 27-30 June 2005).
The Proceedings of the Symposium edited by Y.L. Bai, Q.S. Zheng and Y.G. Wei have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-5623-9.
- 05-3 *IUTAM Symposium on Impact Biomechanics: From Fundamental Insights to Applications*
(Dublin, Ireland 11-15 July, 2005).
The Proceedings of the Symposium edited by M.D. Gilchrist, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2005.
ISBN 978-1-4020-3795-5.
- 05-4 *IUTAM Symposium on Vibration Control of Nonlinear Mechanisms and Structures*
(Munich, Germany 18-22 July, 2005).
The Proceedings of the Symposium edited by H. Ulbrich and W. Günthner, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2005. ISBN 978-1-4020-4160-0.
- 05-5 *IUTAM Symposium on Topological Design Optimization of Structures, Machines and Materials - Status and Perspectives*
(Aalborg and Lyngby, Denmark, 26-29 October, 2005).
The Proceedings of the Symposium edited by M.P. Bendsøe, N. Olhoff and O. Sigmund, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2006. ISBN 978-1-4020-4729-9.

2006

- 06-1 *IUTAM Symposium on Multiscale Problems in Multibody System Contacts* (Stuttgart, Germany, February 20-23, 2006).
The Proceedings of the Symposium edited by Peter Eberhard, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2006. ISBN 978-1-4020-5980-3
- 06-2 *IUTAM Symposium on Interactions for Dispersed Systems in Newtonian and Viscoelastic Fluids* (Guanajuato, Mexico, March 26-31, 2006).
A report on the Symposium was published and appeared in *Physics of Fluids*, Vol 18, 121501-1, 2006.
- 06-3 *IUTAM Symposium on Plasticity at the Micron Scale* (Lyngby, Denmark, May 21 - May 25, 2006).
The Proceedings of the Symposium edited by V. Tvergaard, have been published by IOP Publishing, in a special issue of *Modelling and Simulation in Materials Science and Engineering*, Volume 15, number 1, 2007, ISSN 0965-0393.
- 06-4 *IUTAM Symposium on Hamiltonian Dynamics, Vortex Structures, Turbulence* (Moscow, Russia, August 25-30, 2006).
The Proceedings of the Symposium edited by Borisov, A.V., Kozlov, V.V. et.al., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6743-3
- 06-5 *IUTAM Symposium on Discretization Methods for Evolving Discontinuities* (Lyon, France, September 04-07, 2006).
The Proceedings of the Symposium edited by Combescure, Alain, Borst, René de, Belytschko, Ted, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6529-3
- 06-6 *IUTAM Symposium on Computational Physics and new Perspectives in Turbulence* (Nagoya, Japan, September 11-14, 2006).
The Proceedings of the Symposium edited by Kaneda, Yukio, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6471-5

- 06-7 *IUTAM Symposium on Dynamics and Control of Nonlinear Systems with Uncertainty*
(Nanjing, China, September 18-22, 2006).
The Proceedings of the Symposium edited by Hu, H. Y., Kreuzer E.J., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6331-2
- 06-8 *IUTAM Symposium on Flow Control and MEMS*
(London, UK, September 19-22, 2006).
The Proceedings of the Symposium edited by Morrison, J.F., Birch, D.M., Lavoie, P., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6857-7
- 06-9 *IUTAM Symposium on Computational Contact Mechanics*
(Hannover, Germany, November 05-09, 2006).
The Proceedings of the Symposium edited by Wriggers, Peter, Neckenhorst, Udo have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2007. ISBN 978-1-4020-6404-3

2007

- 07-1 *IUTAM Symposium on Shell, Plate, Beam and 3D Models*
(Tbilisi, Georgia, April 23-28, 2007).
The Proceedings of the Symposium edited by Jaiani, George; Podio-Guidugli, Paolo, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2008. ISBN 978-1-4020-8773-8.
- 07-2 *IUTAM Symposium on Recent Advances in Multiphase Flows: Numerical and Experimental* (Istanbul, Turkey, June 11-14, 2007).
The Proceedings of the Symposium have been published as a regular issue of the journal *Physics of Fluids*, Vol. 20, Issue 4, April 2008, together with selected papers from the meeting, all of which will have gone through the standard reviewing process of that journal.
- 07-3 *IUTAM Symposium on Unsteady Separated Flows and their Control*
(Corfu, Greece, June 18-22, 2007).
The Proceedings of the Symposium edited by Braza, Marianna; Hourigan, K. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009, and as a special issue of the *Journal of Fluids and Structures*, Vol. 24, Issue 8, November 2008. ISBN: 978-1-4020 9897-0.
- 07-4 *IUTAM Symposium on Scaling in Solid Mechanics*
(Cardiff, UK, June 25-29, 2007).
The Proceedings of the Symposium edited by Borodich, F., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009. ISBN 978-1-4020-9032-5.

- 07-5 *IUTAM Symposium on Fluid- Structure Interaction in Ocean Engineering* (Hamburg, Germany, July 23-26, 2007).
The Proceedings of the Symposium edited by Edwin Kreuzer, have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2008. ISBN 978-1-4020-8629-8
- 07-6 *IUTAM Symposium on Swelling and Shrinking of Porous Materials: From Colloid Science to Poromechanics* (Petrópolis, Brazil, August 6-10, 2007).
The Proceedings of the Symposium have been published as a special issue of the *Anais da Academia Brasileira de Ciencias*, Vol. 82(1), Mar. 2010.
- 07-7 *IUTAM Symposium on Advances in Micro- and Nanofluidics* (Dresden, Germany, September 6-8, 2007).
The Proceedings of the Symposium edited by Ellero, M.; Hu, X.; Fröhlich, J.; Adams, N., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009. ISBN 978-90-481-2625-5.
- 07-8 *IUTAM Symposium on Mechanical Properties of Cellular Materials* (Cachan, France, September 17-20, 2007).
The Proceedings of the Symposium edited by Zhao, Han; Fleck, N.A., have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009. ISBN 978-1-4020-9403-3.
- 07-9 *IUTAM Symposium on Multi- Scale Plasticity of Crystalline Materials* (Eindhoven, The Netherlands, November 05-09, 2007).
The Proceedings of the Symposium have been published as a special issue of the *Philosophical Magazine* (Publisher: Taylor & Francis), Vol. 88, Issue 30 – 32, October 2008.

2008

- 08-1 *IUTAM Symposium on Theoretical, Computational and Modelling Aspects of Inelastic Media* (Cape Town, South Africa, January 14-18, 2008).
The Proceedings of the Symposium edited by Daya Reddy have been published by Springer Academic Publishers, The Netherlands, 2008. ISBN: 978-1-4020-9089-9
- 08-2 *IUTAM Symposium on Modelling Nanomaterials and Nanosystems* (Aalborg, Denmark, 19-22 May, 2008).
The Proceedings of the Symposium edited by Pyrz, R. and Rauhe, Jens C. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009. ISBN: 978-1-4020-9556-6
- 08-3 *IUTAM Symposium on Cellular, Molecular and Tissue Mechanics* (Woods Hole, Mass., USA, June 18-21, 2008).

- The Proceedings of the Symposium edited by Garikipati, Krishna and Arruda, Ellen M. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010. ISBN: 978-90-481-3347-5
- 08-4 *IUTAM Symposium on Variational Concepts with Applications to the Mechanics of Materials* (Bochum, Germany, September 22-26, 2008).
The Proceedings of the Symposium edited by Hackl, Klaus have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010 ISBN: 978-90-481-9194-9
- 08-5 *IUTAM Symposium on 150 Years of Vortex Dynamics* (Technical University of Denmark, October 12-16, 2008).
The Proceedings of the Symposium edited by Aref, Hassan have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010 ISBN: 978-90-481-8583-2
- 08-6 *IUTAM Symposium on Progress in the Theory and Numerics of Configurational Mechanics* (Erlangen, Germany, October 20-24, 2008).
The Proceedings of the Symposium edited by Steinmann, Paul have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2009 ISBN: 978-90-481-3446-5
- 08-7 *IUTAM Symposium on Turbulence in the Atmosphere and Oceans* (Cambridge, UK, December 8 — 12, 2008).
The Proceedings of the Symposium edited by Dritschel, David have been published by Springer, 2010. ISBN:978-94-007-0359-9
- 08-8 *IUTAM Symposium on Multi-Functional Material Structures and Systems* (Bangalore, India, December 10-12, 2008).
The Proceedings of the Symposium edited by Dattaguru, B., Gopalakrishnan, Srinivasan and Aatre, V. K. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010. ISBN: 978-90-481-3770-1
- 2009**
- 09-1 *IUTAM Symposium on Dynamic Fracture and Fragmentation* (Austin, USA, March 8-12, 2009).
The Proceedings of the Symposium have been published as a special issue of the International Journal of Fracture (Publisher: Springer), 2010 and by Springer (Ravi-Chandar, Krishnaswamy; Vogler, Tracy J. (Eds.) 2010) ISBN 978-90-481-9759-0
- 09-2 *IUTAM Symposium on Emerging Trends in Rotor Dynamics* (New Delhi, India, March 23 - March 26, 2009)

- The Proceedings of the Symposium edited by Gupta, K. have been published by Springer, 2011. ISBN 978-94-007-0019-2
- 09-3 *IUTAM Symposium on Recent Advances of Acoustic Waves in Solids* (Taipei, Taiwan, May 25-28, 2009)
The Proceedings of the Symposium edited by Wu, Tsung-Tsong and Ma, Chien-Ching have been published by Springer, 2010
ISBN 978-90-481-9892-4
- 09-4 *IUTAM Symposium on Laminar-Turbulent Transition* (Stockholm, Sweden, 2009).
The Proceedings of the Symposium edited by Schlatter, Philipp and Henningson, Dan S. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010. ISBN: 978-90-481-3722-0
- 09-5 *IUTAM Symposium on the Vibration Analysis of Structures with Uncertainties* (St. Petersburg, Russia, July 5–9, 2009)
The Proceedings of the Symposium edited by Belyaev, Alexander K. and Langley, Robin S. have been published by Springer, 2011
ISBN 978-94-007-0288-2
- 09-6 *IUTAM Symposium on The Physics of Wall-Bounded Turbulent Flows on Rough Walls* (Cambridge, UK, July 7-9, 2009).
The Proceedings of the Symposium edited by Nickels, T. B. have been published by Springer Academic Publishers, Dordrecht, The Netherlands, 2010
ISBN: 978-90-481-9630-2
- 09-7 *IUTAM Symposium on Multiscale Modelling of Fatigue, Damage and Fracture in Smart Materials* (Freiberg, Germany, September 1-4, 2009)
The Proceedings of the Symposium edited by Kuna, Meinhard and Ricoeur, Andreas have been published by Springer, 2011. ISBN 978-90-481-9886-3
- 09-8 *IUTAM Symposium on Mathematical Modeling and Physical Instances of Granular Flows* (Cambridge, UK, July 7-9, 2009).
The Proceedings of the Symposium edited by Joe Goddard, J.T. Jenkins and P. Giovine have been published as AIP Conference Proceedings 1227, April 2010
ISBN 978-0-7354-0772-5
- 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.
- 10-6 *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**

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 - Comptes 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 (was 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, Piazzelle delle Scienze 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.

21th 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. Kowaleski, have been published by Springer, Dordrecht, The Netherlands, 2005. ISBN 1-4020-3456-3.

Publications on the history of IUTAM*IUTAM - A Short History,*

edited by S. Juhasz, has been published by Springer-Verlag, Berlin, Germany, 1988. ISBN 3-540-50043-X.

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.

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

Please note again:

The publications listed above, with the exception of the Annual Reports over the last five years and the booklet “Mechanics at the Turn of the Century”, are not available at the IUTAM Secretariat. Please order directly from the publisher.

Details of all IUTAM publications may be found at

<http://www.iutam.net>

List of Addresses

A full mailing list is available upon request to the Secretary General of IUTAM.

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