

REPORT 2004

INTERNATIONAL UNION OF THEORETICAL AND
APPLIED MECHANICS

REPORT 2004



Eindhoven University of Technology
THE NETHERLANDS

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Bureau: Officers and Members

The following members of the Bureau of IUTAM have been elected for the period 1 November 2004 to 31 October 2008:

Officers

Professor L.B.Freund (USA)	President
Professor H.K. Moffatt (UK)	Vice-President
Professor J. Engelbrecht (Estonia)	Treasurer
Professor D.H. van Campen (Netherlands)	Secretary-General

Members

Professor T. Kambe (Japan)	(2004)
Professor A. Kluwick (Austria)	(2004)
Professor N. Olhoff (Denmark)	(2004)
Professor Z. Zheng (China)	(2004)

Secretariat

IUTAM-Secretariat, Department of Mechanical Engineering,
Eindhoven University of Technology, 5600 MB Eindhoven, The Netherlands
Telephone: +31 40 247 2710, Telefax: +31 40 243 7175
E-mail: sg@iutam.net
Internet: <http://www.iutam.net> or <http://www.iutam.org> or <http://www.iutam.info>

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)

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

Adhering Organizations

Argentina (1959)

Asociacion Argentina de Mecanica 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 Theoretical and Applied Mechanics of the
Australian Academy of Sciences
GPO Box 783, Canberra City, ACT 260
President/Chair: Prof. N. (Nhan) Phan-Thien
Contact: Prof. N. (Nhan) Phan-Thien
Representatives in IUTAM: Prof. N. (Nhan) Phan-Thien, Prof. R.I. (Roger) Tanner

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. H. (Hans) Troger
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, B-1000 Brussels
Secretary: Prof. Roland Decuypere
President/Chair: Prof. P. (Philippe) Boulanger
Contact: Prof. R. (Roland) Keunings
Representatives in IUTAM: Prof. P. (Philippe) Boulanger, Prof. E. (Erik) Dick, Prof.
D.V.H. (Dirk) Vandepitte

Brazil (1982)

Associação Brasileira de Ciências Mecânicas
Avenida Rio Branco 124/18° andar, 20040-001 Rio de Janeiro
President/Chair: Prof. L. (Leonardo) Goldstein Junior
Contact: Prof. L. (Luiz) Bevilacqua
Representatives in IUTAM: 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. A. (Anguel) Baltov

Secretary: Dr. E. (Evtim) Ttoshev

Contact: Prof. A. (Anguel) Baltov

Representatives in IUTAM: Prof. A. (Anguel) Baltov

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. S.B. (Stuart) Savage

Representatives in IUTAM: Prof. J. (Jorn) Hansen, Prof. S.B. (Stuart) Savage, Prof. D.

(David) Weaver, 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 Zhong Guan Cun Road, Beijing 100080

President/Chair: Prof. E. (Er-jie) Cui

Contact: Prof. W. (Wei) Yang

Representatives in IUTAM: Prof. Y. (Yi-long) Bai, Prof. E. (Er-jie) Cui, Prof. W. (Wei)

Yang, Prof. Z. (Zhemin) Zheng

China-Hong Kong (1996)

The Hong Kong Society of Theoretical and Applied Mechanics (HKSTAM)

Department of Civil & Structural Engineering, Hong Kong Polytechnic University, Hung

Hom, Kowloon, HK

President/Chair: Prof. K.T. (Kam Tim) Chau

Secretary: Dr. K.W. (Kwok Wing) Chau

Contact: Dr. K.W. (Kwok Wing) Chau

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

China-Taipei (1980)

The Society of Theoretical and Applied Mechanics

Department of Hydraulic & Ocean Engineering, National Cheng Kung University,
Tainan, Taiwan 701

President/Chair: Prof. S.-H. (Shan-Hwei) Ou

Secretary: Prof. T.-W. (Tai-Wen) Hsu

Contact: Prof. T.-W. (Tai-Wen) Hsu

Representatives in IUTAM: Prof. W.-H. (Wen-Hwa) Chen, Prof. C.-S. (Chau-Shioung)
Yeh

Croatia (1994)

Croatian Society of Mechanics

Ivana Lucica 5, HR-10000 Zagreb, Croatia.

President/Chair: Prof. F. (Franjo) Matejcek

Contact: Prof. I. (Ivo) Alfircic

Representatives in IUTAM: Prof. I. (Ivo) Alfircic

Czech Republic (1993/1949)

The National Committee of Theoretical and Applied Mechanics

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

President/Chair: Dr. R. (Rudolf) Dvorák

Secretary: Prof. M. (Miloslav) Okrouhlík

Contact: Dr. R. (Rudolf) Dvorák

Representatives in IUTAM: Dr. R. (Rudolf) Dvorák

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: Prof. B. Munk Olsen

Secretary: Prof. Ole Hansen

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.

Secretary General: Prof. Z.Z. Momeh

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

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. J. (Juri) Engelbrecht
Contact: Prof. J. (Juri) Engelbrecht
Representatives in IUTAM: Prof. J. (Juri) Engelbrecht

Finland (1952)

The Finnish National Committee on Mechanics
Helsinki University of Technology, Attent. Prof. Mauri Määttänen, P.O.Box 4300, FIN-02015 TKK, Finland
President/Chair: Prof. M. (Mauri) Määttänen
Secretary: Prof. J. (Juha) Paavola
Contact: Prof. M. (Mauri) Määttänen
Representatives in IUTAM: Prof. M. (Mauri) Määttänen, Prof. J. (Juha) Paavola

France (1949)

Comité National Français de Mécanique, Académie des Sciences
23, quai Conti, F-75006 Paris
President/Chair: Prof. S. (Sébastien) Candel
Secretary: Prof. L. (Frederic) Dias
Contact: Prof. S. (Sébastien) Candel
Representatives in IUTAM: Prof. A. (Ahmed) Benallal, Prof. L. (Frederic) Dias, Prof. S. (Stéphane) Zaleski, Prof. A. (Andre) Zaoui

Georgia (2000)

National Committee of Theoretical and Applied Mechanics
I. Vekua Institute of Applied Mathematics of Tbilisi State University, 2 University Str., Tbilisi 0143
Co-Chairman: Prof. G. (George) Jaiani, Prof. D. (Demuri) Danelia
Secretary-General: Prof. G. (Gela) Kipiani
President/Chair: Prof. G. (George) Jaiani
Contact: Prof. G. (George) Jaiani
Representatives in IUTAM: Prof. G. (George) Jaiani

Germany (1950)

Deutsches Komitee für Mechanik (DEKOMECH)
Lehrstuhl für Technische Mechanik, Universität Erlangen-Nürnberg, Egerlandstraße 5, D-91058 Erlangen
President/Chair: Prof. G.R. (Günther) Kuhn
Secretary: Prof. P. (Paul) Steinmann
Contact: Prof. P. (Paul) Steinmann
Representatives in IUTAM: Prof. U. (Ulrich) Gabbert, Prof. C. (Christian) Miehe, Prof. W. (Wolfgang) Schröder, Prof. A. (André) Thess

Greece (1979)

Hellenic Society for Theoretical and Applied Mechanics

National Technical University of Athens, Laboratory of Steel Structures, 42 Patission street, GR-10682 Athens

President/Chair: Prof. A.N. (Anthony) Kounadis

Secretary: Prof. I. (Ioannis) Vardoulakis

Contact: Prof. D.E. (Dimitri) Beskos

Representatives in IUTAM: Prof. A.N. (Anthony) Kounadis

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

Contact: Prof. S. (Sandor) Kaliszky

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. N.K. (Narinder) Gupta

Contact: Prof. N.K. (Narinder) Gupta

Representatives in IUTAM: Prof. G. (Gautam) Biswas, Prof. S.M. (Suresh) Deshpande, Prof. N.K. (Narinder) Gupta

Ireland (1984)

Irish National Committee for Theoretical and Applied Mechanics

Royal Irish Academy, 19 Dawson Street, Dublin 2

President/Chair: Prof. P.E. (Padraic) O'Donoghue

Secretary: Dr. J.J. (James) Grannell

Contact: Prof. P.E. (Padraic) O'Donoghue

Representatives in IUTAM: Prof. P.E. (Padraic) O'Donoghue

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. M.B. (Miles) Rubin

Representatives in IUTAM: Prof. I. (Isaac) Goldhirsch, 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. A. (Angelo) Morro

Secretary: Prof. C. (Carlo) Cinquini

Contact: Prof. A. (Angelo) Morro

Representatives in IUTAM: Prof. C. (Carlo) Cercignani, Prof. G. (Giulio) Maier, Prof. P. (Paolo) Podio-Guidugli, Prof. F. (Furio) Vatta

Japan (1951)

The National Committee for Theoretical and Applied Mechanics

Science Council of Japan, 7- 22-34 Roppongi, Minato-ku, Tokyo 106-8555

President/Chair: Prof. K. (Koji) Uetani

Contact: Prof. T. (Tsutomu) Kambe

Representatives in IUTAM: Prof. T. (Tsutomu) Kambe, Prof. T. (Toshio) Kobayashi, Prof. K. (Koji) Uetani, Prof. E. (Eiichi) Watanabe

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

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

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. Jim Watson

Chief Executive Officer: Dr. S.C. Thompson

Contact: Dr. G. (Graham) Weir

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. B.N. (Bjorn) Gjevik

Contact: Prof. B.N. (Bjorn) Gjevik

Representatives in IUTAM: Prof. B.N. (Bjorn) Gjevik

Poland (1952)

Committee for Mechanics of the Polish Academy of Sciences

ul. Swietokrzyska 21, PL-00 049 Warszawa

President/Chair: Prof. A. (Andrzej) Styczek

Contact: Prof. W. (Witold) Gutkowski

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. J. A. C. (João) Martins

Representatives in IUTAM: Prof. J. A. C. (João) Martins

Romania (1956)

Romanian Academy, Department of Mathematics, Romanian National Committee of Theoretical and Applied Mechanics

Calea Victoriei 125, 71102 Bucharest, Romania

President/Chair: Prof. N.D. (Nicolai) Cristescu

Secretary: Dr. G. (Gabriela) Marinoschi

Contact: Prof. N.D. (Nicolai) Cristescu

Representatives in IUTAM: Prof. N.D. (Nicolai) Cristescu

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. G.K. (Gleb) Mikhailov

Representatives in IUTAM: Prof. G.G. (Gorimir) Chernyi, Prof. D.M. (Dmitry) Klimov,

Prof. G.K. (Gleb) Mikhailov, Prof. N.F. (Nikita) Morozov

Saudi Arabia (1988)

Directorate of Technology and International Cooperation

P.O. Box 6086, Riyadh 11442

President/Chair: Dr. S.A. (Saleh) Al-Athel

Contact: Mr. F.S. (Fahad) Huraib

Representatives in IUTAM: Dr. S.A. (Saleh) Al-Athel

Serbia and Montenegro (2002/1952)

Yugoslav Society of Mechanics

Kneza Milosa 9/1, 11000 Belgrade

President/Chair: Prof. L.J. (Livija) Cveticanin

Secretary: Dr. D.M. (Dubravka) Mijuca

Contact: Prof. L.J. (Livija) Cveticanin

Representatives in IUTAM: Prof. L.J. (Livija) Cveticanin

Slovakia (1993)

The Slovak Society for Mechanics

Council of Scientific Societies, Stefánikova 49, SK-811 04 Bratislava

President/Chair: Prof. J. (Jozef) Brilla

Contact: Prof. J. (Jozef) Brilla

Representatives in IUTAM: Prof. J. (Jozef) Brilla

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

Contact: 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: Dr. I. (Igle) Gledhill

Contact: Prof. C.G. (Charl) du Toit

Representatives in IUTAM: Prof. C.G. (Charl) du Toit

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

Chalmers University of Technology, SE-412 96 Gothenburg

President/Chair: Prof. L (Lennart) Josefson

Secretary: Prof. L. (Lars) Davidson

Contact: Prof. L. (Lars) Davidson

Representatives in IUTAM: Prof. A. (Anders) Boström, Prof. B. (Bengt) Lundberg, Prof. B. (Bertil) Storåkers

Switzerland (1950)

Board of the Federal Institutes of Technology (Rat der Eidgenössischen Technischen Hochschulen)

ETH-Zentrum, CH-8092 Zürich

President/Chair: Prof. A.J.B. (Alexander) Zehnder

Secretary: Dr. S. (Sebastian) Brändli

Contact: 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. M.A. (Mehmet Ali) Tasdemir

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. P.W. (Peter) Carpenter

Secretary: Prof. B.L. (Bhushan) Karihaloo

Contact: Prof. B.L. (Bhushan) Karihaloo

Representatives in IUTAM: Prof. P.W. (Peter) Carpenter, 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

Contact: 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. W.G. (Wolfgang) Knauss

Secretary: Prof. C.T. (Carl) Herakovich

Contact: Prof. C.T. (Carl) Herakovich

Representatives in IUTAM: Prof. H. (Hassan) Aref, Prof. T. (Ted) Belytschko, Prof. C.T. (Carl) Herakovich, Prof. W.G. (Wolfgang) Knauss, Prof. L.G. (Gary) Leal

Viet Nam (1990)

Vietnamese Association of Mechanics (VAM)
Hoi Co Hoc Vietnam, 264 Doi Can, Hanoi

Secretary: Prof. Do Sanh

President/Chair: Prof. N. (Nguyen) Van Dao

Contact: Prof. N. (Nguyen) Van Dao

Representatives in IUTAM: Prof. N. (Nguyen) Van Dao

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. L. (Leen) van Wijngaarden

Representative of CISM in IUTAM-CC: Prof. M.G. (Manuel) Velarde

ICHMT (1972)

International Centre for Heat and Mass Transfer

Mechanical Engineering Dept. Middle East Technical University, 06531 Ankara, Turkey

President/Chair: Prof. M. (Maurizio) Cumo

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. J.C. (Jae Chun) Hyun

Secretary: Prof. M. (Manfred) Wagner

Contact: Prof. M. (Manfred) Wagner

Representative of ICR in IUTAM: Prof. L.G. (Gary) Leal

Representative of IUTAM in ICR: Prof. F. (Frithiof) Niordson

Representative of ICR in IUTAM-CC: Prof. L.G. (Gary) Leal

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. P. (Peter) Lugner

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. K. Wilmanski, Weierstrass Institute, Berlin, Germany

President/Chair: Prof. M. (Mario) Pitteri

Secretary: Prof. A. (Adriano) Montanaro

Contact: Prof. A. (Adriano) Montanaro

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

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

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

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. Y.-W. (Yiu-Wing) Mai

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

Contact: Prof. B.L. (Bhushan) Karihaloo

Representative of ICF in IUTAM: Prof. B.L. (Bhushan) Karihaloo

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

Representative of ICF in IUTAM-CC: Prof. B.L. (Bhushan) Karihaloo

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. F. (Fernand) Ellyin

Secretary: Prof. T. (Toshihiko) Hoshide

Contact: Prof. F. (Fernand) Ellyin

Representative of ICM in IUTAM: Prof. F. (Fernand) Ellyin

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

Representative of ICM in IUTAM-CC: Prof. F. (Fernand) Ellyin

AFMC (1982)

Asian Fluid Mechanics Committee

Kushiro National College of Technology, Kushiro 084-0916, Japan

President/Chair: Prof. M. (Masaru) Kiya

Contact: Prof. M. (Masaru) Kiya

Representative of AFMC in IUTAM: Prof. M. (Masaru) Kiya

Representative of IUTAM in AFMC: Prof. I. (Isao) Imai

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. E.R. (Eduardo) de Arantes e Oliveira

Representative of IACM in IUTAM-CC: Prof. T. (Ted) Belytschko

CACOFD (1992)

Caribbean Congress of Fluid Dynamics

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. (D.) Comissiong

Contact: Prof. H. (Harold) Ramkissoon

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

Representative of IUTAM in CACOFD: Prof. D.D. (Daniel) Joseph

IABEM (1994)

International Association for Boundary Element Methods

Prof. M. Bonnet, CNRS et Ecole Polytechnique, Laboratoire de Mecanique 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. M.P (Martin) Bendsøe

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

Representative of ISSMO in IUTAM-CC: Prof. M.P (Martin) Bendsøe

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

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

IHAV (1997)

International Institute of Acoustics and Vibration

Prof M. J. Crocker. Dept. of Mechanical Engineering, 201 Ross Hall, Auburn University, Auburn, AL 36849 USA

President/Chair: Prof. J.W. (Jan) Verheij

Secretary: N.J. (Nicole) Kessissoglou

Contact: Prof. M.J. (Malcolm) Crocker

Representative of IHAV in IUTAM: Prof. M.J. (Malcolm) Crocker

Representative of IUTAM in IHAV: Prof. J.D. (Jan) Achenbach

ICA (1998)

International Commission for Acoustics

President/Chair: Prof. P.A. (Philip) Nelson

Secretary: Prof. S. (Sonoko) Kuwano

Contact: Prof. S. (Sonoko) Kuwano

Representative of ICA in IUTAM: Prof. S.H. (Stephen) Crandall

Representative of IUTAM in ICA: Prof. A. (Anders) Boström

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

Members of the General Assembly

<i>Member</i>	<i>Representative of</i>	<i>Remarks</i>
Prof. A. (Andreas) Acrivos		Member-at-Large
Dr. S.A. (Saleh) Al-Athel	Saudi Arabia	
Prof. I. (Ivo) Alfrevic	Croatia	
Prof. H. (Hassan) Aref	USA	
Prof. Y. (Yi-long) Bai	China	
Prof. A. (Anguel) Baltov	Bulgaria	
Prof. T. (Ted) Belytschko	USA	
Prof. A. (Ahmed) Benallal	France	
Prof. L. (Luiz) Bevilacqua	Brazil	
Prof. G. (Gautam) Biswas	India	
Prof. S.R. (Sol) Bodner		Representative in ICM Member-at-Large
Prof. B. (Bruno) Boley		Member-at-Large
Prof. R. (René) de Borst	Netherlands	
Prof. A. (Anders) Boström	Sweden	Representative in ICA
Prof. P. (Philippe) Boulanger	Belgium	
Prof. J. (Jozef) Brilla	Slovakia	
Prof. D.H. (Dick) van Campen	Netherlands	Bureau member
Prof. P.W. (Peter) Carpenter	UK	
Prof. C. (Carlo) Cercignani	Italy	Bureau member
Prof. W.-H. (Wen-Hwa) Chen	China-Taipei	
Prof. G.G. (Gorimir) Chernyi	Russia	
Prof. N.D. (Nicolai) Cristescu	Romania	
Prof. E. (Er-jie) Cui	China	
Prof. L.J. (Livija) Cveticanin	Serbia and Montenegro	
Prof. S.M. (Suresh) Deshpande	India	
Prof. L. (Frederic) Dias	France	
Prof. E. (Erik) Dick	Belgium	
Prof. J. (Jürg) Dual	Switzerland	
Dr. R. (Rudolf) Dvorák	Czech Republic	Representative in ICHMT
Prof. J. (Juri) Engelbrecht	Estonia	Bureau member
Prof. L.B. (Ben) Freund		Bureau member
Prof. U. (Ulrich) Gabbert	Germany	
Prof. P. (Paul) Germain		Member-at-Large
Prof. B.N. (Bjorn) Gjevik	Norway	
Prof. I. (Isaac) Goldhirsch	Israel	
Prof. N.K. (Narinder) Gupta	India	
Prof. W. (Witold) Gutkowski	Poland	
Prof. A.N. (Alexandr) Guz	Ukraine	

Member	Representative of	Remarks
Prof. J. (Jorn) Hansen	Canada	
Prof. M.A. (Michael) Hayes		Representative of ISIMM, Member-at-Large
Prof. C.T. (Carl) Herakovich	USA	
Prof. P.G. (Philip) Hodge		Member-at-Large
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. (Tsutomu) Kambe	Japan	
Prof. B.L. (Bhushan) Karihaloo	UK	Representative of ICF
Prof. D.M. (Dmitry) Klimov	Russia	
Prof. A. (Alfred) Kluwick	Austria	
Prof. W.G. (Wolfgang) Knauss	USA	
Prof. T. (Toshio) Kobayashi	Japan	
Prof. A.N. (Anthony) Kounadis	Greece	
Prof. L.G. (Gary) Leal	USA	Representative of ICR
Prof. F. (Fernando) Lund	Chile	
Prof. B. (Bengt) Lundberg	Sweden	
Prof. G. (Giulio) Maier	Italy	
Prof. J.A.C. (João) Martins	Portugal	
Prof. C. (Christian) Miehe	Germany	
Prof. G.K. (Gleb) Mikhailov	Russia	
Prof. H.K. (Keith) Moffatt		Bureau member Representative in HYDROMAG
Prof. P.A. (Peter) Monkewitz	Switzerland	
Mr. A. (Angel) Moratilla	Spain	
Prof. N.F. (Nikita) Morozov	Russia	
Prof. M. (Mauri) Määttänen	Finland	
Prof. F. (Frithiof) Niordson		Representative in ICR Member-at-Large
Prof. P.E. (Padraic) O'Donoghue	Ireland	
Prof. N. (Niels) Olhoff	Denmark	Representative in ISSMO
Prof. J. (Juha) Paavola	Finland	
Prof. N. (Nigel) Peake	UK	
Prof. T.J. (Timothy) Pedley	UK	
Prof. N. (Nhan) Phan-Thien	Australia	
Prof. P. (Paolo) Podio-Guidugli	Italy	
Prof. M.B. (Miles) Rubin	Israel	
Prof. S.B. (Stuart) Savage	Canada	

Member	Representative of	Remarks
Prof. W. (Werner) Schiehlen		Representative in IAVSD Member-at-Large
Prof. W. (Wolfgang) Schröder	Germany	
Prof. L. (Leopold) Skerget	Slovenia	
Prof. A.A.(Anton) v. Steenhoven	Netherlands	
Prof. B. (Bertil) Storåkers	Sweden	
Prof. E.S. (Erdogan) Suhubi	Turkey	
Prof. G. (Gwidon) Szefer	Poland	
Prof. J.N. (Jens Nørkær) Sørensen	Denmark	
Prof. V. (Vitauts) Tamuzs	Latvia	
Prof. R.I. (Roger) Tanner	Australia	
Prof. T. (Tomomasa) Tatsumi		Member-at-Large
Prof. A. (André) Thess	Germany	
Prof. C.G. (Charl) du Toit	South Africa	
Prof. K. (Koji) Uetani	Japan	
Prof. N. (Nguyen) Van Dao	Viet Nam	
Prof. D.V.H. (Dirk) Vandepitte	Belgium	
Prof. F. (Furio) Vatta	Italy	
Prof. E. (Eiichi) Watanabe	Japan	
Prof. D. (David) Weaver	Canada	
Prof. G. (Graham) Weir	New Zealand	
Prof. L. (Leen) van Wijngaarden		Representative in CISM Member-at-Large
Prof. W. (Wei) Yang	China	
Prof. C.-S. (Chau-Shioung) Yeh	China-Taipei	
Prof. J.Y. (Jung Yul) Yoo	Republic of Korea	
Prof. T.X. (Tongxi) Yu	China-Hong Kong	
Prof. S. (Stéphane) Zaleski	France	
Prof. A. (Andre) Zaoui	France	
Prof. Z. (Zhemín) Zheng	China	
Prof. F. (Franz) Ziegler		Member-at-Large
Prof. J.W. (Jean) Zu	Canada	

Observers to the General Assembly

<i>Name</i>	<i>Country</i>	<i>Representative of</i>
Prof. J.D. (Jan) Achenbach	USA	Chair Solids Symp. Panel
Prof. E.R. (Eduardo) Arentes e Oliveira	Portugal	Chair WP-5
Prof. F. (Faruk) Arinc	Turkey	ICHMT
Prof. D. (Dominique) Barthès-Biesel	France	Chair WP-6
Prof. M. (Marc) Bonnet	France	IABEM
Prof. S.H. (Stephen) Crandall	USA	ICA
Prof. M.J. (Malcolm) Crocker	USA	IIAV
Prof. F. (Fernand) Ellyin	Canada	ICM
Prof. R.B. (Richard) Hetnarski	USA	ICTS
Prof. P. (Patrick) Huerre	France	EUROMECH Chair Fluids Symp. Panel
Prof. B.L. (Bhushan) Karihaloo	UK	ICF
Prof. M. (Masaru) Kiya	Japan	AFMC
Prof. P.F. (Paul) Linden	USA	Chair WP-8
Prof. P. (Peter) Lugner	Austria	IAVSD
Prof. R.M. (Robert) McMeeking	USA	Chair WP-4
Prof. R. (René) Moreau	France	HYDROMAG
Prof. J.T. (John Tinsley) Oden	USA	IACM
Prof. J.R.A. (Anthony) Pearson	UK	Chair WP-1
Prof. F. (Friedrich) Pfeiffer	Germany	Chair WP-2
Prof. H. (Harold) Ramkissoon	West Indies	CACOFD
Prof. G. (George) Rozvany	Hungary	ISSMO
Prof. B.A. (Bernhard) Schrefler	Italy	CISM

Members of the Congress Committee

*Year indicates end of term (applies to members elected after 1972)

<i>Member</i>	<i>Country</i>	<i>Year*</i>	<i>Remarks</i>
Prof. H. (Hassan) Aref	USA	2008	Member of XCCC
Prof. N. (Nadine) Aubry	USA	2008	
Prof. D. (Dominique) Barthès-Biesel	France	2008	
Prof. T. (Ted) Belytschko	USA	2006	Representative of IACM
Prof. M.P. (Martin) Bendsøe	Denmark	2008	Representative of ISSMO
Prof. D.E. Beskos	Greece	2006	
Prof. D.H. (Dick) van Campen	Netherlands	2008	
Prof. A. (Alberto) Carpinteri	Italy	2008	
Prof. G.-D. (Gengdong) Cheng	China	2008	
Prof. D. (David) Durban	Israel	2008	
Prof. F. (Fernand) Ellyin	Canada	2006	Representative of ICM
Prof. N.A. (Norman) Fleck	UK	2006	
Prof. L.B. (Ben) Freund	USA	2004	President Member of XCCC
Prof. I.G. (Irina) Goryacheva	Russia	2008	
Prof. P. (Peter) Gudmundson	Sweden	2008	
Prof. M.A. (Michael) Hayes	Ireland	2006	Representative of ISIMM
Prof. T. (Tutomu) Kambe	Japan	2008	
Prof. B.L. (Bhushan) Karihaloo	UK	2008	Representative of ICF
Prof. A. (Alfred) Kluwick	Austria	2006	
Prof. T.A. (Tomasz) Kowalewski	Poland	2008	Member of XCCC
Prof. V.V. (Valery) Kozlov	Russia	2006	
Prof. E.J. (Edwin) Kreuzer	Germany	2006	
Prof. S. (Stelios) Kyriakides	USA	2008	
Prof. P. (Pierre) Ladevèze	France	2008	
Prof. L.G. (Gary) Leal	USA	2008	Representative of ICR
Prof. F. (Fernando) Lund	Chile	2008	
Prof. P.A. (Peter) Monkewitz	Switzerland	2008	
Prof. T.J. (Timothy) Pedley	UK	2008	Secretary Member of XCCC
Prof. B.A. (Bernhard) Schrefler	Italy	2006	Member of XCCC
Prof. K. (Kazimierz) Sobczyk	Poland	2006	
Prof. A. (André) Thess	Germany	2008	
Prof. E.O. (Ernie) Tuck	Australia	2006	
Prof. V. (Viggo) Tvergaard	Denmark	2008	
Prof. M.G. (Manuel) Velarde	Spain	2006	Representative of CISM
Prof. E. (Eiichi) Watanabe	Japan	2006	

Members of the Symposia Panels

The Bureau of IUTAM in 1977 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. The following members have been elected in 2004 for the period up to and including the 2008 meeting of the General Assembly

Fluid Mechanics

Prof. D. (Dan) Henningson
Prof. P. (Patrick) Huerre (chairman)
Prof. T. (Tsutomu) Kambe
Prof. L.G. (Gary) Leal
Prof. D.H. (Howell) Peregrine

Solid Mechanics

Prof. J.D. (Jan) Achenbach (chairman)
Prof. F.L. (Felix) Chernousko
Prof. W. (Wolfgang) Ehlers
Prof. V. (Viggo) Tvergaard
Prof. J. (John) Willis

Members of the Working Parties

Based on the assessment of IUTAM, the General Assembly in Cambridge, UK (August 2002) agreed 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, whose latest revision is dated March 2003. A pdf version of the report can be downloaded from the IUTAM website.

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

WP-1: Non-Newtonian Fluid Mechanics and Rheology

Members: Prof. J. R. A. (Anthony) Pearson, UK (chair); Prof. D.V. (David) Boger, Australia; Prof. R. (Roland) Keunings, Belgium; Prof. L.G. (Gary) Leal, USA

WP-2: Dynamical Systems and Mechatronics

Members: Prof. F. (Friedrich) Pfeiffer, Germany (chair); Prof. F.L. (Felix) Chernousko, Russia; Prof. R.S. (Robin) Sharp, UK; Prof. M. Tomizuka, USA

WP-3: Mechanics of Materials

Members: Prof. S. R. (Sol) Bodner, Israel (chair); Prof. C.T. (Carl) Herakovich, USA; Prof. T. (Tatsuo) Inoue, Japan; Prof. J.B. (Jean Baptiste) Leblond, France

WP-4: Materials Processing

Members: Prof. R.M. (Robert) McMeeking, USA (chair); Prof. S. (Shigeo) Asai, Japan; Prof. C.W. (Christopher) Macosko, USA; Prof. R. (René) Moreau, France

WP-5: Computational Fluid and Solid Mechanics

(this WP acts as link between IUTAM and IACM)

Members: Prof. E. R. (Eduardo) de Arantes e Oliveira, Portugal (chair); Prof. Y.K. Cheung, China-Hong Kong; Prof. J. (Jacob) Fish, USA; Dr. S. R. (Sergio) Idelsohn, Argentina; Prof. P. (Pierre) Ladevèze, France; Prof. J. T. (Tinsley) Oden, USA

WP-6: Biomechanics

Members: Prof. D. (Dominique) Barthès-Biesel, France (chair); Prof. J.E. (Joan) Bechtold, USA; Dr. G.A. (Gerhard) Holzapfel, Austria; 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. M.G. (Grae) Worster, UK

WP-8: Geophysical and Environmental Mechanics

Members: Prof. P.F. (Paul) Linden, USA; 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: vacancy (chair); Prof. H. (Hassan) Aref, USA; Prof. Y. (Yi-long) Bai, China; Prof. M.H.A. (Mohammed) Hassan, Sudan

Donations in 2004

Donations given to IUTAM Symposia are recorded under the heading “Financial Support” of the Reports of Symposia and Summer Schools held in 2004.

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. H. K. Moffatt
COSPAR	Committee on Space Research	Prof. G. G. Chernyi
SCOPE	Scientific Committee on Problems of the Environment	Prof. J.C.R. Hunt
SCOR	Scientific Committee on Oceanic Research	Prof. W. Fennel

Reports of IUTAM Symposia held in 2004

04-1 IUTAM Symposium on Size Effects on Material and Structural Behavior at Micron- and Nanometer-Scales Hongkong, China, May 30 - June 04, 2004

a) Scientific Committee

P. Tong (Chairmen, Hong Kong, China), N. Fleck (UK), H. Gao (Germany), J. Hutchinson (USA), K.C.Hwang (Beijing, China), W. Nix (USA), A. Zaoui (France), W. Zhong (Dalian, China), L. B. Freund (IUTAM Representative).

b) Short summary of scientific progress achieved

The aim of this symposium is to bring scientists from materials science, biology, physics and mechanics together to discuss different aspects and the latest advances of this active multi-discipline field. Sponsored by the IUTAM, this 4-day symposium followed the tradition of IUTAM and was held in the single session format of IUTAM symposia. The scientific presentation and discussions focused on the following topics:

1. Behaviour of materials and structures at micron- and nanometer-scales;
 2. Physical bases of size effects;
 3. Adaptive and multi-functional behavior of materials at small scales;
 4. Size effect in fracture and phase transformation of solids;
 5. Multi-scale modeling and simulation;
 6. Microstructure and deformation with moving interfaces;
 7. Size effect in Material instability and its propagation;
- 35 oral presentations were made by distinguished scholars. Theoretical, experimental and computational aspects of the subject were discussed and addressed in the symposium. Two Round Table Discussions were arranged on the future research directions.

c) Countries represented and number of participants

60 registered participants (some of them are PhD students and Postdoctors) attended the technical session of the symposium. 35 invited speakers came from 8 countries: Australia (1), China mainland (10), France (3), USA (7), China Hong Kong (10), UK (1), Sweden (1), Germany (1), Poland (1), Taiwan (1).

d) Publication of Proceedings of the Symposium

An 8-page full-length paper is required of every speaker for inclusion in the proceedings volume. Each manuscript was reviewed by two reviewers so as to achieve an academic standard comparable to that of a refereed journal in the field. All these papers will be

published in Kluwer Academic Publisher's book series Solid Mechanics and Its Applications.

e) Financial supports

The symposium was sponsored by

- IUTAM (The International Union of Theoretical and Applied Mechanics)
- US National Science Foundation (NSF)
- RGC (Research Grant Council of Hong Kong SAR)
- NSFC (Natural Science Foundation of China)
- Kluwer Academic Publishers
- Hong Kong University of Science and Technology
- HKSTAM (The Hong Kong Society of Theoretical and Applied Mechanics)

f) Scientific program

May 31, 2004

Deformation and Diffusion in Nano-grained Metals, Wei Yang, XinLing Ma, HongTao Wang, Wei Hong

Multiscale Analysis of Strength Enhancement of Cellular Materials under Impact Loading, H.Zhao, S.Abdenadher, I.Nasri

Micromechanics of Micropolar Composites, Gengkai Hu

An MD Investigaton of the Size Effect on Multiscale Simulation of Thin Film Delamination, Zhen Chen, Luming Shen

Fracture Analysis in the Conventional Theory of Mechanism-based Strain Gradient (CMSG) Plasticity, K. C. Hwang, S. Qu, Y. Huang, H. Jiang, C. Liu, P. D. Wu

Fractal and Scaling Phenomena on Fracture at Micro-scales, Chunsheng Lu Yiu-Wing Mai

A Multi-Scale Modeling Scheme for Sub-Micron Size Effects on Cyclic Plasticity, Jinghong Fan, Zhihui Gao, Xiangguo Zeng, Jinghong Fan

Level Set Simulations of the Formation of Dislocation Networks and Junctions, Yang Xiang, David J. Srolovitz, Weinan E, Li-Tien Cheng

Issues and Challenges in Multiscale Modeling of Bio/Nano Systems, A.M. Rajendran

June 1, 2004

Nucleation of Phases and Local Minimizers of Energy, John Ball

Solid-solid Phase Transformations: Non-existence of One-dimensional Stress Problems, Model Equation and Uniqueness Conditions, Hui-Hui Dai

Morphological Instability and Kinetics of an Elastic Film on a Viscoelastic Substrate, R. Huang

Magnetization Reversal and Hysteresis in Nanocrystalline Ferromagnets, Jiangyu Li, Heliang Qu

Effects of the Structural Topology and Connection Size on the Strength of Circular Honeycombs under In-plane Compression, T.X. Yu, D. Karagozova

Size Effects of Nanoindentation Creep, H. Li, A.H.W. Ngan

Multi-scale Characterizations for Ductile Thin Film Delamination, Yueguang Wei, Guanshui Xu

An Experimental Investigation of the Relationship between Molecular Structure and Length Scales in Inelastic Deformation of an Amorphous Thermoplastic, Jessica Agde Tjernlund, E. Kristofer Gamstedt, Zhi-Hui Xu

Impact of Phase Transition on the Nano-indentation Hardness and Microwear Behavior of NiTi Shape Memory Alloy, Linmao Qian, Xudong Xiao, Qingping Sun, Tongxi Yu, *Round Table Discussion On Future Research Directions*, Chair: K.C. Hwang and P. Tong

June 2, 2004

Particle Size Effects in NANocomposites, A. Zaoui, V. Marcadon, E. Hervé
Mechanism-based Strain Gradient Crystal Plasticity, Chung-Souk Han, Huajian Gao, Chung-Souk Han, William D. Nix, Yonggang Huang

Size Effect in Magnetic Materials, X.X. Zhang

On Modeling Deformation Instability and Pattern Formation during Phase Transition in NiTi Microtubing, Y. J. He

Plastic Deformation of Rough Surfaces in the Nanoindentation Test, Tong-Yi Zhang

Multiscale Mechanics of Carbon Nanotubes and Their Composites, Xi-Qiao Feng
A Phase-Field Method for Optimization of Solid Structures: Cahn-Hilliard Model, Michael Yu Wang, Shiwei Zhou

Modeling of Austenite/martensite Laminates with Interfacial Energy Effect, H. Petryk, S. Stupkiewicz, G. Maciejewski

Size Effect in Nano/molecular Electromechanical Systems: Function over Strength, Wanlin Guo

Round Table Discussion On Future Research Directions, Chair: Z. Zaoui and H. Petryk

June 3, 2004

Size Effects of Phase Transition in Thin Films, C.H. Woo, B. Wang, Z. Man, Hanchen Huang

Tunable Ferroelectric Phase Transition, Biao Wang, C.H. Woo

Mechanical Strengths of Low-K Dielectric Thin Films, Sanboh Lee, T. C. Liu,
B.-T. Chen, S. M. Jang

Energy Penalties in Materials with Microstructures of Phase Transitions, Yongzhong
Huo

*Homogenization Method for Strength and Inelastic Behavior of Nanocrystalline
Materials*, Laurent Capolungo, Jianmin Qu, Mohammed. Cherkaoui

Effects of Surface Energy on the Elastic Behavior of Nano-particles, Remi Dingreville,
Jianmin Qu, Mohammed Cherkaoui

Size Effect in Formation of Junctions and Defects in Carbon Nanotubes, San-Qiang Shi,
F.Y. Meng, L.G. Zhou, F.Y. Meng, R. Yang

Report composed by Qingping Sun

**04-2 IUTAM Symposium on Mechanics of Biological Tissue
Graz, Austria, June 27 - July 02, 2004****a) Scientific Committee**

G.A. Holzapfel (Chair, Austria), R.W. Ogden (UK), S.C. Cowin (USA), J. Engelbrecht (Estonia), J.D. Humphrey (USA), J.M. Huyghe (The Netherlands), P.J. Prendergast (Ireland), A. Rachev (Bulgaria)

b) Short summary of scientific progress achieved

The mechanics of biological tissues, both soft and hard tissues, is a multidisciplinary and rapidly expanding area of research. Several prestigious universities have established new foci on this promising field, which brings together researchers in engineering, physics, biology, medicine and applied mathematics.

The IUTAM symposium provided important new directions and emphases on the need to combine these disciplines with the exciting new developments in biology. The symposium aimed to foster this interaction by including state-of-the-art presentations on the following topics.

- Mechanics of soft and hard tissues at the molecular, cellular, tissue and organ levels, with the aim of providing a deeper understanding of tissue structure and function.
- Mechanobiology, a new research area aimed at understanding better how mechanical information is processed and programmed by the cells. Of particular interest will be inter-relations between the mechanical and biological processes such as growth, remodelling, and repair.
- Experimental, microstructural, continuum mechanical and computational perspectives, with an emphasis on modelling the mechanical behaviour of tissues and simulating therapeutic and diagnostic procedures such as balloon angioplasty and stenting.

Because of the complexity of the material properties and the geometries encountered in applications, implementation of the biomechanical models in numerical codes is vital. An efficient numerical tool is one of the prerequisites for the design and development of soft and hard tissue prostheses. Thus, numerical aspects were also well represented. A common goal for those working in the mechanics of biological tissue is to analyse and tabulate, to search for causal connections and to make predictions on the basis of abstraction and general principles. Therefore, we need to ask fundamental questions and we need to create new technologies for solving problems related to the mechanics of biological tissues; in other words, tissue biomechanics offers a positive heuristic. Hence, another aim of the IUTAM symposium was to provide a forum for discussion and comparison of different methods and approaches in the field and for the unification of

these approaches, to bring together young researchers and the world's leading scientists working in the field, and to stimulate the study of challenging new topics in the mechanics of biological tissue.

c) Countries represented and number of participants

We brought together an international pool of delegates actively working in the field of biomechanics and mechanobiology. Many are highly respected scientists with large numbers of rigorously reviewed journal articles; one participant has a two more than 10 publications in Science and Nature.

A total of 96 registered attendees from 19 countries participated in this Symposium: Austria (12), Brazil (1), Bulgaria (1), Canada (2), Czech Republic (4), Estonia (1), France (3), Germany (11), Ireland (4), Israel (1), Italy (9), Japan (4), New Zealand (2), The Netherlands (2), Spain (1), Sweden (1), Switzerland (7), UK (4), USA (26)

d) Publication of Proceedings of the Symposium

The proceedings of selected papers in the symposium will be published by Springer-Verlag, Heidelberg in 2005. This volume is being edited by G.A. Holzapfel and R.W. Ogden.

e) Financial supports

The organizers are deeply indebted for the following institutions and companies for their generous financial support in the preparation of the Symposium.

- Angiomed GmbH & Co. Medizintechnik KG, Karlsruhe, Germany
- Anton Paar GmbH, Graz, Austria
- Boston Scientific, Wien, Austria
- Centerpulse Orthopedics Ltd a Zimmer Company, Winterthur, Switzerland
- Fonds zur Förderung der wissenschaftlichen Forschung (FWF), Wien, Austria
- IUTAM - International Union of Theoretical and Applied Mechanics
- Johnson&Johnson Medical Products GmbH, Wien, Austria
- Messphysik Materials Testing GmbH, Fürstenfeld, Austria
- Springer-Verlag Heidelberg GmbH & Co.KG, Heidelberg, Germany
- Steiermärkische Bank und Sparkassen AG, Graz, Austria
- The Generics Group Ltd, Cambridge, United Kingdom

f) Scientific program

In addition to 42 oral presentations, 15 poster presentations were scheduled.

Day 1**Session 1:**

G.A. Holzapfel, Chairman of the Scientific Committee, *What is Our Wish in Tissue Biomechanics?*

P.J. Hunter, J. Fernandez, H. Schmid, M. Tawhai, P. Nielsen, M. Nash, (Keynote Lecture), *Challenges in Modeling Soft Tissue Mechanics*

Session 2:

J.D. Humphrey, (Keynote Lecture), *Biomechanics of Arterial Growth and Remodeling*
M.A. Zulliger, A. Rachev, **N. Stergiopoulos**, *A Constitutive Formulation of Arterial Mechanics Including Vascular Smooth Muscle Tone*

A. Rachev, *Solid Mechanics Approach to Some Remodeling-Related Problems in Arterial Grafting*

Session 3:

S.C. Cowin, (Keynote Lecture) *Reading Bones: Insights into the Modeling of Bone Morphogenesis, Growth and Adaptation*

Ph. K. Zysset, *Architecture Based Yield and Failure Criteria for Trabecular Bone*

M. Doblaré, J.M. García, M.J. Gómez-Benito, *Impact of Different Loading Conditions on Bone Fracture Healing*

Session 4:

R. Müller, *Time-Lapsed Microstructural Imaging of Bone Function*

M.S. Sacks, T. Lam, J. Stella, *A Structural Constitutive Model for the Native Pulmonary Valve*

Day 2:**Session 5:**

W. Ehlers, B. Markert, A. Acartürk, N. Karajan, *A Coupled FE Analysis of the Intervertebral Disc Based on a Multiphasic TPM Formulation*

J.M. Huyghe, R.W. Roos, Y. Schroeder, *Coupling Finite Deformation, Electric Potentials and Chemical Potentials*

S.M. Klisch, *A Bimodular Second Order Constitutive Theory for Fiber-Reinforced Soft Biological Tissues*

Session 6:

R. Lakes, (Keynote Lecture), *Viscoelastic and Microelastic Behavior of Tissue*

D.P. Pioletti, *Viscoelastic Constitutive Law for Biological Tissue*

J.C. Criscione, *Semi-Inverse Solution to Extension and Inflation of a Thick-Walled Tube*

Poster Session:

M. Auer, R. Stollberger, P. Regitnig, F. Ebner, G.A. Holzapfel, *MRI-Based Morphological 3D Reconstruction of Atherosclerotic Lesions*

- L.D. Blecha, P.Y. Zambelli, N.A. Ramaniraka, L.R. Rakotomanana, P.-E. Bourban, J.-A. Manson, D.P. Pioletti, *How Plate Positioning Impacts the Biomechanics of the Open Wedge Varus Osteotomy; A Finite Element Analysis*
- F. Cacho, P.J. Elbischger, M. Doblaré, T.C. Gasser, G.A. Holzapfel, *From Image Data to Numerical Simulation: A Constitutive Model for Arterial Walls Considering Statistical Fiber Distribution*
- S. Delorme, D. Laroche, R. DiRaddo, J. Buihieu, M. Stadler, G.A. Holzapfel, *Interaction of the Deployment System and Arterial Wall During Balloon Angioplasty*
- E. Diouf, M. Cheref, M. Zidi, *Mechanical Study of a Prototype of Small Diameter Vascular Graft*
- C. Gauvin, A.M. Yousefi, R. DiRaddo, J. Fernandes, *Biphasic Modelling of Functional Tissue Engineering Scaffolds Surrounded by Native Tissues*
- R.L. Gleason Jr., J.D. Humphrey, *Mechanically-Induced Vascular Adaptations: A new Approach to Modeling and Experimentation*
- K. Malakpoor, E.F. Kaasschieter, C.J. van Duijn, J.M.R.J. Huyghe, *Mixed Finite Element Modeling of Cartilaginous Tissues*
- C.T. McCarthy, M.D. Gilchrist, M. Hussey, *Finite Element Modelling of Cutting Biomaterials with Surgical Instruments*
- A.N. Mefti, B. Haussy, J.F. Ganghoffer, *Development of Red Blood Cell Adhesion With the Vein Walls: A Probabilistic Approach*
- A. Menzel, G. Himpel, E. Kuhl, P. Steinmann, *Anisotropic Remodeling of Biological Tissues*
- S.A. Riboldi, M. Sampaolesi, P. Neuenschwander, F.M. Montevecchi, G. Cossu, S. Mantero
Skeletal Muscle Tissue Engineering: Line Myoblasts and Primary Satellite Cells on Electrospun DegraPol® Scaffolds
- H. Schmid, M.P. Nash, P. J. Hunter, *Sensitivity Analysis of Myocardial Material Parameters in Orthotropic Constitutive Laws*
- J. Stålhand, *In-vivo Aorta Parameter Identification Using a Relaxed Force Constraint*
- R. Wang, N. Katsube, R.R. Seghi, S.I. Rokhlin, *Statistical Failure Analysis of Ceramic/Dentin Layered Structures*

Session 7:

- L.J. Gibson**, *Contractile Response of Fibroblasts on a Collagen-GAG Scaffold*
- B.P. Murphy, P. McGarry, B. Flaherty, **P.E. McHugh**, *Prediction of Changes in Cell Morphology and Adhesion Using a 3D Cohesive Zone Model*

Session 8:

- K. Grosh**, N. Deo, *Nonlinear Constitutive Models for Cochlear Outer Hair Cells*
- F. Boschetti, M.T. Raimondi, **F. Migliavacca**, R. Pietrabissa, *Microfluid-Dynamics in Three Dimensional Engineered Cell Systems*

Day 3:

Session 9:

J.A. Weiss, A.I. Veress, G.T. Gullberg, N. Phatak, Q. Sun, D. Parker, R.D. Rabbitt, *Strain Measurement Using Deformable Image Registration*

S.J. Hollister, C.Y. Lin, C.Y. Lin, *Computational Analysis and Optimization of Tissue Engineering Scaffolds Using Image-Based Hierarchical Homogenization Approaches*

T. Yang, **R.L. Spilker**, *A Mixed Finite Element Formulation for Three-Dimensional Contact of Biphasic Soft Tissues*

Session 10:

K. Hayashi, (Keynote Lecture), *Tensile Properties and Local Stiffness of Cells*

H. Gao, *Mechanics of Flaw-Tolerant Nanostructures of Biological Systems*

M.C. Boyce, *Mechanics of Softening Biopolymers*

Day 4:**Session 11:**

S.C. Calve, K. Garikipati, K. Grosh, K. Baar, H. Narayanan, **E.M. Arruda**, *Characterization and Modelling of Growth and Remodelling in Engineered Tendon Constructs*

E. Kuhl, G. Himpel, A. Menzel, P. Steinmann, *Modeling and Simulation of Isotropic and Anisotropic Growth in Hard and Soft Biological Tissues*

J. Engelbrecht, M. Vendelin, *Mathematical Modelling of Cardiac Mechanoenergetics*

Session 12:

P.D. Richardson, (Keynote Lecture), *Mechanical Properties of Atherosclerotic Tissues*
A.S. Khalil, T. Zhu, R. Chan, A. Chau, B. Bouma, R. Kamm, **M. Kaazempur-Mofrad**, *Characterization of Atherosclerotic Plaques using OCT-Based Elastography, Novel Parameter Estimation Techniques, and FEM*

K.B. Chandran, D.D. McPherson, *Material Property Alterations with Early Atheroma in an Animal Model*

Session 13:

P.B. Canham, R.M. Korol, R. Hammond, A.R. Lucas, (Keynote Lecture), *Human Brain Arteries and Aneurysms – Their Collagen Organization and Biomechanics*

M. Oshima, R. Torii, K. Takagi, *Image-Based Simulation of Blood Flow and Arterial Wall Interaction for Cerebral Aneurysms*

M.R. Moreno, J. Bedoya, C. Meyer, **J.E. Moore Jr.**, *The Role of Biomechanics in the Restenosis of Stented Arteries*

Session 14:

P.J. Prendergast, C. Lally, *Simulation of In-stent Restenosis and its Relationship with Cardiovascular Stent Design*

A.D. Freed, D.R. Einstein, I. Vesely, *Invariant Theory for Dispersed Transverse Isotropy. An Efficient Means for Modeling Fiber Splay*

Day 5:**Session 15:**

R.J. Clifton, M.S. Hahn, X. Jia, T. Jiao, *Viscoelastic Response of Vocal Fold Tissues and Scaffolds at High Frequencies*

E. Mazza, A. Nava, M. Bauer, R. Winter, G. A. Holzapfel, *In Vivo Experiments to Characterize the Mechanical Behavior of the Human Cervix*

S. Socrate, *Exploring the connections between Molecular Structure and Mechanical Function of the Extracellular Matrix*

Session 16:

T. Matsumoto, T. Furukawa, M. Taniguchi, K. Nagayama, *Microscopic Analysis of Residual Stress and Strain in the Aortic Wall*

R.W. Ogden, A. Guillou, *Residual Stress Development and Growth in Soft Tissue*

G.A. Holzapfel, M. Stadler, T.C. Gasser, M. Auer, *Challenges in Modeling Atherosclerotic Lesions Following Balloon Angioplasty and Stenting*

Report composed by Gerhard A. Holzapfel and Ray W. Ogden

04-3 IUTAM Symposium on Size Effects on Non-Uniqueness of Solutions to the Navier-Stokes Equations and their Connection with Laminar-Turbulent Transition
Manchester, UK, August 09-11, 2004

a) Scientific Committee

T. Mullin (UK, Chair), O. Dauchot (France), B. Eckhardt (Germany), D.S. Henningson (Sweden), R.R. Kerswell (UK), W. Schliehler (Germany), F.A. Waleffe (USA)

b) Short summary of scientific progress achieved

The aim of the Symposium was to bring together theoreticians and experimentalists to discuss recent developments in the study of transition to turbulence in shear flows. Over 3 days and 21 lectures (13 invited + 8 contributed), various groups from around the world presented their latest results ranging from identifying the initial optimal disturbances which can trigger transition, through to pattern formation in transitional flows and self-sustaining processes in shear flows. Issues such as how a turbulent flow can re-laminarise and transition processes in non-Newtonian flows were also discussed. Theoretical approaches involved both low-order models and full numerical simulation of the Navier Stokes equations. The experimental work was primarily concerned with plane Couette and pipe flows and there was considerable overlap with the reported theoretical work. The overarching achievement of the symposium was to highlight the increasing evidence for the appearance of alternative solutions to the Navier-Stokes equations which are not connected in any simple way to the well known exact solutions for pipe and Couette flows i.e. they are disconnected states. Evidence reported at the meeting suggests that they may be important for structuring laminar-turbulent transition in shear flows. The clear challenges identified in the meeting are to extend the theoretical support and experimental evidence for this idea and to explore whether it can be developed to make predictions about when transition will occur and what form it will take.

c) Countries represented and number of participants

32 registered participants from engineering, physics and applied mathematics communities attended the symposium. The geographical representation was as follows: 9 from the UK, 7 from France, 6 from the US, 3 from Sweden, 2 from Japan, 2 from Holland, 1 each from Germany, Belgium and Italy.

d) Publication of Proceedings of the Symposium

Full papers from the lectures are going to be published as Symposium Proceedings by Springer Science and Business Media (former Kluwer). Each submitted paper has been reviewed by either a member of the Scientific Committee or another contributing participant. There are 17 articles which will produce a proceedings volume of

approximately 250 pages. The planned publication date is August 2005 and we are on schedule to meet this.

e) Financial supports

Some funds were made available by IUTAM, the London Mathematical Society and Kluwer. The LMS funds were particularly helpful in inviting younger participants.

f) Scientific program

Monday, August 9

P. Manneville, *What can we learn from models about the direct transition to turbulence in plane Couette flow*

A. Prigent, *Turbulent-laminar versus laminar-turbulent transition: the Couette flow case*

S. Toh, *Co-supporting cycle: sustaining mechanism of large-scale structures and near-wall structures in channel flow turbulence*

D. Desmidts, *Low-dimensional dynamics of the POD eigenfunctions in the autonomous minimal channel flow*

D. Barkley, *Computational study of turbulent-laminar patterns in Couette flow*

B. Hof, *First observation of travelling waves in experimental pipe flow*

F. Waleffe, *On the scaling of the lower branch exact coherent states of plane Couette flow*

M. Graham, *Interactions between polymer dynamics and self-sustaining coherent flow structures: a model for turbulent drag reduction*

A. Morozov, *Nonlinear instabilities in flows of visco-elastic fluids*

Tuesday, August 10

J. Stuart, *The role of Reynolds' stresses, nonlinearity and vortex stretching in the evolution of singularities*

B. Eckhardt, *Strange saddles in the transition to turbulence*

L. Tuckerman, *Computational study of turbulent-laminar patterns in Couette flow: part II*

P. Cvitanovic, *Hopf's last hope: spatiotemporal chaos in terms of unstable recurrent patterns*

D. Henningson, *Thresholds and linear mechanisms in shear flow transition*

A. Bottaro, *Minimal defects*

C. Cossu, *On the minimum threshold energy and the nonlinearly-optimal perturbations in subcritical instabilities*

V. Shrira, *A bypass scenario of laminar-turbulent transition in the wind-driven free-surface boundary layer*

Wednesday, August 11

S. Tavener, *The effect of cylinder rotation on vortex shedding*

P. Alfredsson, *Instability, transition and turbulence in plane Couette flow with system rotation*

M. Nagata, *Nonlinear solutions of simple plane shear layers with and without a system rotation*

P-Y. Longaretti, *Subcritical turbulence in rotating shear flows*

Report composed by Tom Mullin and Rich Kerswell

**04-4 IUTAM Symposium on One Hundred Years of Boundary Layer Research
Göttingen, Germany, August 12-14, 2004**

a) Scientific Committee

D.H. van Campen (The Netherlands), P. Huerre (France), T. Kambe (Japan), G.E.A. Meier (Germany, Chairman), H.K. Moffatt (United Kingdom), A. Roshko (USA), F. Smith (United Kingdom), K.R. Sreenivasan (Italy, Chairman), I.J. Wygnanski (USA)

b) Short summary of scientific progress achieved

One hundred years ago, Prandtl wrote a seminal paper on boundary layer theory which laid the foundation for modern fluid dynamics. From that extraordinarily original paper has sprung a research area of great consequence in aerodynamics and hydrodynamics. The idea has led to the development of countless approximate methods in nonlinear mathematics. It is a tribute to Prandtl's genius that today's researchers find the boundary layer a valuable concept while tackling challenging problems. It is especially impressive that the enormous increase in computing power has not made the idea outdated. Indeed, proper application of computing methods requires an understanding of boundary layers even in contexts far outside those initially conceived by Prandtl.

The Symposium celebrated the centenary of Prandtl's paper on the boundary layer and brought together a diverse community of researchers working on different aspects of the boundary layer. That the research area continues to engage a large, wide-ranging and active band of scientists and engineers was evident in the attendance of experts. The Symposium covered an appropriate combination of established and new work, with theory, experiments and computations describing many of the different types of boundary and other layers, incorporating traditional as well as novel applications.

The Scientific Programme comprised 3 days with the presentation of 41 Lectures and 5 Posters, organized into 6 Sessions. Scientific progress arose through all the major topics discussed at the Symposium. The scientific program of the meeting is listed at f).

The meeting was fascinating, interdisciplinary and stimulating. Ideas were put forward on all the above aspects. In addition, the meeting served as a forum for assessing progress in the understanding of laminar and turbulent flows, steady and unsteady flows, two-dimensional and three-dimensional modelling, and incompressible and compressible behaviour. The scientific sessions highlighted, in particular, the roles of theory, experiments and computations throughout and the desirability of comparing their predictions with each other. The need to develop new areas of application as well refining work in traditional challenging areas was emphasized.

c) Countries represented and number of participants

77 registered participants from the engineering, physics and applied mathematics communities attended regularly the technical Sessions of the Symposium, coming from 16 different countries, according the following geographical distribution: Austria (2), France (3), Germany (33), India (2), Israel (1), Italy (1), Japan (4), Malaysia (1), Russia (2), Serbia-Montenegro (1), Spain (2), Sweden (1), Switzerland (3), The Netherlands (3), U.K. (4) and USA (14). A number of German Scientists from DLR also attended some scientific sessions.

d) Publication of Proceedings of the Symposium

Full papers of both lectures and poster presentations are going to be published as Symposium Proceedings by Springer Science and Business Media (former Kluwer). For each submitted paper, the review process has been driven by getting a review either from members of the Scientific Committee (primarily) or from other participants of the Symposium, with the aim of achieving a standard of the Proceedings comparable to that of refereed journals in the field. Some contributions have been reviewed by two experts. As of today (29 June 2005) the review process is finished. All articles are with the Publisher for layout-check.

e) Financial supports

Some funds were made available by:

- International Union of Theoretical and Applied Mechanics (IUTAM)
- Springer Science and Business Media (former Kluwer Academic Publishers)
- Deutsche Forschungsgemeinschaft, DFG, Bonn, Germany

f) Scientific program

Thursday, August 12, 2004

Session 1: Classification, Definition and Mathematics of Boundary Layers

G.E.A. Meier: *Prandtl's Concept and the Work in Göttingen*

T. Kambe: *Vorticity in Flow Fields Related to Prandtl's Work and Subsequent Developments*

P.R. Spalart: *The Full Lifespan of the Boundary-Layer and Mixing-Length Concepts*

J. Cousteix, J. Mauss: *Rational Basis of the Interactive Boundary Layer Theory*

M. Oberlack: *Symmetry Methods in Turbulent Boundary Layer Theory*

M. Hafez, E. Wahba: *Viscous/Inviscid Interaction Procedures for Compressible Aerodynamic Flow Simulations*

Session 2: Instability of Boundary Layers and Transition

D. Henningson: *The Application of Optimal Control to Boundary Layer Flow*

V. Theofilis, A. Fedorov, S.S. Collis: *Leading-Edge Boundary Layer Flow: Prandtl's Vision, Recent Developments and Future Perspectives*
E. Reshotko, A. Tumin: *Application of Transient Growth Theory to Bypass Transition*
Y.S. Kachanov: *Routes of Boundary-Layer Transition*
J.D. Crouch: *Instabilities in Boundary-Layer Flows and their Role in Engineering*
A. Seitz, K.-H. Horstmann: *In-Flight Investigations of Tollmien-Schlichting Waves*
M. Gaster: *The Influence of Roughness on Transition*
O.S. Ryzhov, E.V. Bogdanova-Ryzhova: *Boundary-Layer Instabilities in Transonic Range of Velocities, with Emphasis on Upstream Advancing Wave Packets*

Friday, August 13, 2004

Session 3: Boundary Layers Control

I. Wygnanski: *A Century of Active Control of Boundary Layer Separation – A Personal view*

P.R. Viswanath: *Boundary Layer Separation Control by Manipulation of Shear Layer Reattachment*

W. Saric, H. Reed: *Stability, Transition, and Control of Three-Dimensional Boundary Layers on Swept Wings*

T. Corke, E.H. Matlis: *Transition to Turbulence in 3-D Boundary Layers on a Rotating Disk - Convective and Absolute Instabilities*

A. Seifert, L. Pack-Melton: *Control and Identification of Turbulent Boundary Layer Separation*

Session 4: Turbulent Boundary Layers

J. Jimenez: *The Near-Wall Structures of Turbulent Boundary Layer*

A.J. Smits, M.P. Martin: *Turbulence in Supersonic and Hypersonic Boundary Layers*

H.-H. Fernholz: *The Role of Skin-Friction Measurements in Boundary Layers with Variable Pressure Gradients*

R. Narasimha: *Laminar-Turbulent-Laminar Transition Cycles*

Session 5: Numerical Treatment and Boundary Layer Modelling

W. Rodi: *Turbulence Modelling for Boundary-Layer Calculations*

H. Fasel: *Instability and Transition in Boundary Layer Flows: Direct Numerical Simulations*

F. Menter, Y. Egorov: *Re-Evaluation of the Scale-Equation in Turbulence Modelling*

F.T. Smith: *Industrial and Biomedical Applications*

Saturday, August 14, 2004

Session 5: Numerical Treatment and Boundary Layer Modelling (continuing)

J. Kim, J. Lim: *Analysis and Control of Boundary Layers: A Linear System Perspective*

P.W. Duck, J.P. Denier, J. Li: *The Development (and Suppression) of very Short-Scale Instabilities in Mixed Forced-Free Convection Boundary Layers*

Chr. Davies: *Computational Studies of Boundary-Layer Disturbance Development*

Session 6: Special Effects in Boundary Layers**H.G. Hornung:** *Hypersonic Real-Gas Effects on Transition***A.A. Maslov:** *Stabilization of Hypersonic Boundary Layer by Microstructural Porous Coating***P.A. Monkewitz, H.M. Nagib:** *The Asymptotic Structure of High-Reynolds Number Boundary Layers***R. Friedrich, J. Sesterhenn:** *Instabilities near the Attachment-Line of a Swept Wing in Compressible Flow***A. Kluwick, St. Braun:** *Structure Formation in Marginally Separated Aerodynamic and Related Boundary Layer Flows***H. Nagib, Chr. Christophorou, P. Monkewitz:** *High Reynolds Number Turbulent Boundary Layers Subjected to Various Pressure-Gradient Conditions***H. Beazard, Th. Daris:** *Analysis of Adverse Pressure Gradient Thermal Turbulent Boundary Layers and Consequence on Turbulence Modelling***C.J. Kähler:** *The Significance of Turbulent Eddies for the Turbulent Mixing in Boundary Layers***G. Kawahara, S. Kida, M. Nagata:** *Unstable Periodic Motion in Plane Couette System: The Skeleton of Turbulence***B.W. van Oudheusden:** *The Reference Temperature Method Reconsidered and its Relation to Compressible Couette Flow***K.R. Sreenivasan:** *Ludwig Prandtl and Turbulent Thermal Convection***Poster-Presentation****A. Goharzadeh, A. Khalili:** *An Experimental Investigation of the Brinkman Layer Thickness at a Fluid-Porous Interface***B. Gölling:** *Experimental Investigations of Turbulent Separated Flows***B. Rasuo:** *On Boundary Layer Control at Two-Dimensional Transonic Wind Tunnel Testing***K.-Kh. Tan:** *A New Theory of Boundary Layer Instability***T. Tatsumi:** *Scale-Separation in Boundary Layer Theory and Statistical Theory of Turbulence***Report composed by Hans-Joachim Heinemann**

**04-5 IUTAM Symposium on Elastohydrodynamics and Microelasto-hydrodynamics
Cardiff, UK, September 01-03, 2004**

a) Scientific Committee

R.W. Snidle (Chair, UK), L. Chang (USA), H.P. Evans (UK), M. Kaneta (Japan), T. Knudsen (Denmark), T. Lubrecht (France), F. Sadeghi (USA), C.H. Venner (The Netherlands), K. Walters, FRS (UK) and D.H. van Campen (The Netherlands).

b) Short summary of scientific progress achieved

The symposium focused on theoretical, experimental and computational issues in elastohydrodynamic lubrication (EHL) both in relation to smooth surfaces and in situations where the film is of the same order or thinner than the surface roughness (micro-EHL). The last IUTAM Symposium in this general area of contact of deformable bodies was in 1974. The emphasis in the Symposium was upon fundamental issues such as: solution methods; lubricant rheological models, thermal effects; both low and high elastic modulus situations; human and replacement joints; fluid traction; dynamic effects, asperity lubrication and the failure of lubrication; surface fatigue and thermal distress under EHL conditions.

The opening lecture was given jointly by Professor Duncan Dowson, FRS and Sir Gordon Higinson, the distinguished partnership which produced some of the most important numerical solutions to the fundamental EHL problem which led to the first reliable film thickness formula for isothermal, Newtonian conditions. Their presentation reviewed the early developments in the subject and included some fascinating details of the difficulties overcome and the scientific personalities involved.

A total of 32 oral presentations were delivered over a period of three days. A particularly thought-provoking presentation was given by Dr Scott Bair (Georgia Institute of Technology, USA) on the ongoing challenges posed by lubricant rheology. If we are to understand lubricant behaviour under the very severe conditions of a real EHL contact we need to draw upon sources outside conventional tribology such as molecular dynamics simulations, and pursue improved techniques for high pressure measurements. Other papers were on state of the art developments in rough surface lubrication, journal bearing solution techniques, and natural and replacement human joints. The importance of experimental validation techniques was emphasised in a number of papers on thin film methods.

This Symposium on the specialised topic of EHL was attended by leading experts in the field and was judged by the delegates to have succeeded in: attracting stimulating presentations on basic EHL research, encouraging lively and informative discussion, and identifying future goals for the subject.

c) Countries represented and number of participants

The meeting attracted 45 participants from ten countries (China, Czech Republic, Egypt, France, Germany, Italy, Japan, The Netherlands, USA, UK).

d) Publication of Proceedings of the Symposium

The proceedings of the Symposium will be published by Springer Science and Business Media (former Kluwer Academic Publishers) in 2005. Editors are R W Snidle and H P Evans.

e) Financial supports

The Symposium was sponsored by the International Union of Theoretical and Applied Mechanics and the School of Engineering, Cardiff University.
We are grateful for the support of our sponsors.

f) Scientific program**Wednesday, September 1****Session 1**

D. Dowson and G. R. Higginson, *Reflections on early studies of elasto-hydrodynamic lubrication*

Scott Bair, P. Gordon, *Rheological challenges and opportunities for EHL*

Session 2

D. Hart, C. E. Goodyer, P. K. Jimack, M. Berzins, L. E. Scales, *Adjoint error estimation and spatial adaptivity for EHL-like models*

C. H. Venner, C. J. Hooke, *Surface roughness attenuation in line and point EHL contacts under conditions of starved lubrication*

J. F. Booker, S. Boedo, *Unsteady EHL: "nodal" versus "modal" formulations*

P. Yang, J. Cui, *The influence of spinning on the performance of EHL in elliptical contacts*

Session 3

X. Y. Chen, H. Y. Sun, X. J. Shen, *Review and prospect of developments in EHL of finite line contacts*

H. Y. Sun, X. Y. Chen, *Thermal EHL analysis of cylindrical roller under heavy load*

E. Saber, H. A. El-Gamal, *Effect of elastic deformation of the journal bearing shell on its dynamic stability*

Session 4

M. Fox, *A possible molecular dynamic structure contribution to elasto-hydrodynamic lubrication*

I. I. Kudish, R. G. Airapetyan, M. J. Covitch, *Modelling of lubricant degradation and elasto-hydrodynamic lubrication*

D. Rh. Gwynllyw, T. N. Phillips, *The effect of viscoelasticity on the performance of dynamically loaded journal bearings*

Thursday, September 2

Session 5

D. Himmel, I. Jubault, J. L. Mansot, P. Vergne, *Spectroscopic mappings in static and dynamic sphere-plane contacts using Raman microspectrometry*

M. Kaneta, H. Nishikawa, K. Matsuda, *Behaviour of transverse ridges passing through a circular EHL conjunction*

P. Vergne, F. Ville, A. A. Lubrecht, *Experimental investigations on the pressure distribution for pure sliding EHL contacts with dented surfaces*

Session 6

M. Hartl, I. Krupka, D. Zhu, *EHL film thickness behaviour under high pressure – comparison between numerical and experimental results*

H. Baly, G. Poll, P M Cann, A A Lubrecht, *Correlation between model test devices and full bearing tests under grease lubricated conditions*

I. Lee-Prudhoe, C. H. Venner, P. M. Cann and H. A. Spikes, *Experimental and theoretical approaches to thin film lubrication studies*

P. L. Wong, F. Guo, *Extension of conventional optical EHL technique*

Session 7

F. Sadeghi, *Surface modifications for piston ring and liner*

F. Guo, P. L. Wong, *Variations of an EHL film under boundary slippage*

D. Dowson, *EHL in “soft-on-soft” natural synovial joints; “hard-on-soft” cushion and “hard-on-hard” metal joint replacements*

Session 8

I. C. Faraon and D J Schipper, *Stribeck curve for starved concentrated contacts*

A. Polacco, G. Pugliese, E. Ciulli, G. M. Bragallini, M. Facchini, *Investigation on thermal distress and scuffing failure under micro-EHL conditions*

A. Nakajima, T. Mawatari, *Effect of slip ratio on rolling contact fatigue of bearing steel rollers lubricated with traction oil*

H. Qiao, M. J. A. Holmes, H. P. Evans, R. W. Snidle, *Prediction of contact and fatigue damage in rough surface EHL*

Friday, September 3

Session 9

K. J. Sharif, H. P. Evans, R. W. Snidle, *Wear modelling of worm gears*

F. C. Wang and Z. M. Jin, *Lubrication modelling of artificial hip joints*

F. M. Borodich, *Fractals and surface roughness in EHL*

Session 10

C. J. Hooke, *Roughness attenuation and pressure rippling in EHL contacts*

C. Zhang, *Application of parallel programming techniques in analysis of mixed-EHD contact*

C. K. Gao, X. M. Qi, H. P. Evans, R. W. Snidle, *Effect of film thickness ratio on gearing contact fatigue life*

Report composed by Ray Snidle

**04-6 IUTAM Symposium on Mechanics and Reliability of Actuating Materials
Beijing, China, September 01-03, 2004**

a) Scientific Committee

W. Yang (Chair-China), D. Gross (Germany), Y.W. Mai (Australia), R.M. McMeeking (USA), Z. Suo (USA), K. Watanabe (Japan), F. Ziegler (Austria), J. Salençon (France, IUTAM Representative).

b) Short summary of scientific progress achieved

The main themes of the symposium are: Actuating materials hold a promise for fast-spreading applications in smart structures and active control systems, and have attracted extensive attention from scientists of both mechanics and materials sciences communities. High performance and stability of actuating materials and structures play a decisive role in their successive applications as sensors and actuators in structural control and robotics. Toward this end, scientific efforts are of paramount significance to gain a deep insight into the intricate deformation and failure behaviors of actuating materials. Examples worthy of intensive exploration are: (i) the constitutive relations of actuating materials that couple mechanical, electrical, thermal and magnetic properties, as well as incorporate phase transformation and domain switch; (ii) the physical mechanisms of deformation, damage, and fatigue crack growth of actuating materials; (iii) the development of failure-resilient approaches that base on the macro-, meso-, and micro-mechanics analyses; (iv) the investigation of microstructural evolution, stability of phase transformation, and size effects of ferroelectric ceramics, shape memory alloys and actuating polymers. The above problems represent an exciting challenge and form a research thrust of both materials science and solid mechanics. The main aim of this symposium was to assemble top scientists working in the actuating materials to exchange their scientific results and ideas and thereby to further their collaboration in the coming years.

The symposium records the following scientific progresses in the topical area:

1. Various novel methods to measure domain switching zone are proposed. Interrelation between fracture and fatigue with domain switching is confirmed experimentally.
2. The importance of discharge and electric boundary condition is recognized through experiment and theory. An interesting model of charge free zone (CFZ), similar to dislocation free zone for the mechanical case, drawn large attention of the participants.
3. Interaction between domain switching and defect agglomeration is emphasized, the framework of configurational forces and microstructural evolution is under rapid development.
4. Multi-scale constitutive modeling of piezo/ferro/magneto-electric materials gains headways, as addressed through several presentations from different aspects.
5. Numerical schemes for actuating materials is near to the verge of commercial development.

6. Optimal design to maximize the performance of actuating materials in smart structures becomes important, and several ways to accomplish this goal is proposed.
7. Actuating of piezoelectric cylinders, a typical configuration in MEMS.
8. Dynamics and non-destructive detection of actuating materials.
9. Multi-axes testing of ferroelectric ceramics and single crystals.
10. Transformation spirals in nano-grained microtubes, both experiments and numerical simulation verify this new phenomenon.
11. Accumulated experimental data and theoretical framework for biologically actuating materials (such as hearts) and bio-films.

c) Countries represented and number of participants

There were total of 35 invited participants plus about 20 graduate students and postdocs from China to attend the symposium. The geographic distributions of the participants are: Australia (2), Canada (1), China mainland (15), Germany (7), Hong Kong, China (2), Japan (5), UK (2) and USA (1).

d) Publication of Proceedings of the Symposium

A contract for the publication of the symposium proceedings was signed by Springer Science and Business Media (former Kluwer Academic Publishers) and Prof. W. Yang.

e) Financial supports

The symposium was sponsored by the International Union of Theoretical and Applied Mechanics.

f) Scientific program

September 1, 2004

H. Kessler, P. Bürmann and H. Balke, *A switching rule for local domain wall motions and for the macroscopic material response of ferroelectrics*

D.N. Fang and F.X. Li, *The effects of sieving method and poling approach on the internal bias field in donor doped PZT ceramics*

D. Gross and R. Mueller, *Interaction between defects and domain walls in piezoelectric materials*

F. Fang, W. Yang, F. C Zhang, H. S. Luo, *In-situ observation of electrically induced fatigue crack growth for ferroelectric single crystals*

Naotake Noda, Cun-Fa Gao, *Effect of electric fields on fracture of functionally graded piezoelectric materials*

Jürgen Rödel, Alain B. Nijwa Kouna and Doru Lupascu, *Ferroelastic toughening in PZT*

Tong-Yi Zhang, *The charge-free zone model for conductive cracks in dielectric and piezoelectric ceramics*

Y. H. Chen and Z.C. Ou, *Electric potential drop across a crack in piezoelectrics*

H. Berger, S. Kari, N. Bohn, R. Rodriguez and **U. Gabbert**, *A micro-macro approach to design active piezoelectric fiber composites*

Zhen-Bang Kuang, *Quan Jiang*, *Stress analysis in two dimensional electrostrictive material under general loading*

Batra, R.C.,

September 2, 2004

Bin Gu, **Shou-Wen Yu**, Xi-Qiao Feng, *Elastic Sv-wave scattering by an interface crack between a piezoelectric layer and an elastic substrate*

Kuna, Meinhard, *FEM-techniques for thermo-electro-mechanical analyses in smart structures*

Qing-Hua Qin, *Treffitz plane element of piezoelectric plate with p-extension capabilities*

Y. Chen and **R.K.N.D. Rajapakse**, *Electric charge loading of a piezoelectric solid cylinder*

I. Westram, D.C. Lupascu and J. Rödel, *Crack initiation and crack propagation under cyclic electric loading in PZT*

Sven Lentzen and **Rüdiger Schmidt**, *On piezoelectric actuatorlayers in plates and shells at large deflection*

Kazumi Watanabe, *Stress Analysis for an Anisotropic Solid with Variable Off-Axis of Anisotropy*

Qian Wan, **Changqing Chen**, and Yapeng Shen, *Electromechanical behavior of relaxor ferroelectric single crystal (PMN-32PT) and polycrystalline ceramics (PZT5)*

M. Urago, F. Jin, Y. Mochimaru and K. Kishimoto, *Oblique propagation of time harmonic waves in periodic piezoelectric composite layered structures*

S. Hao, B. Moran, D. Chopp, *Biofilm growth: perspectives on two-phase mixture flow and fingerings formation*

F. Jin, K. Kishimoto, Z. Qian and Z. Wang, *Scattering behaviour of elastic waves in 1-3 piezoelectric ceramic/polymer composites*

September 3, 2004

Qing-Ping, Sun, *Pattern formation and evolution in NiTi shape memory alloy microtubing*

Wenyi Yan and Yiu-Wing Mai, *Theoretical consideration on the fracture of shape memory alloys*

L.H. Han and **T.J. Lu**, *3D finite element simulation for shape memory alloys*

Xiao-Jing Zheng, Xin-En Liu, *Constitutive Models for Magnetostrictive Materials*

Z. Zhong and Y. P. Wan, *Vibration analysis of a nonlinear magnetostrictive actuator*

G.-X. Ren, *Test study of feed-support of very large radio telescope*

Biao Wang, C. H. Woo, and Yue Zheng, *Stability analysis of 180o domains in ferroelectric thin films*

X.M. Zhang, F. Yang, N.K. Ma and **W. Yang**, *Damage and fatigue of actuating heart muscles*

Report composed by Wei Yang

**04-7 IUTAM Symposium on Recent Advances in Disperse Multiphase
Flow Simulation
Illinois, USA, October 04-07, 2004**

a) Scientific Committee

S. Balachandar (Chair, USA), A. Prosperetti (USA), E.J. Hinch (UK), N. Kasagi (Japan), D.V. Khakhar (India), J. Magnaudet (France), H.K. Moffatt (UK), M. Reeks (UK), M. Sommerfeld (Germany).

b) Short summary of scientific progress achieved

Although many fluid mechanics and multiphase flow conferences usually feature several sessions devoted to computation in multiphase flow, this was one of the few symposia exclusively devoted to this activity. It was an opportunity to review a considerable amount of high-quality recent work on computational multiphase flow. It afforded an excellent picture of the contemporary activities in this field and prompted a series of reflections.

The symposium was punctuated by three special lectures. Hinch gave the opening lecture, where he set the right tone for the symposium with a discussion of the scaling of velocity fluctuations induced by sedimenting particles. Joseph, who summarized the current status of high-end scientific computations in multiphase flow research as it appeared to him from the talks presented at the symposium, gave the closing lecture. It was his opinion that the current width and depth of research bodes well for the future of computational multiphase flow. On Wednesday (Oct. 6th) the lunch was followed by Some reflections on multiphase flow by Hetsroni. His presentation ranged from some historical notes on boiling, dating back to the Bible and Homer, to reflections on scientific progress in boiling research, to recent statistics on papers published in the International Journal of Multiphase Flow.

Together with experiment and theory, computation has already been for a long time an integral component of multiphase flow research. A striking feature common to most papers presented at the symposium was the power, maturity and sophistication reached by this approach. A few papers conclusively demonstrated that, for some problems, computing is the only means by which key physical phenomena can be elucidated.

Over the last few years the computational capabilities of several groups have reached such a level of sophistication that we are now able to take a first-principles look at complex microphysics that arises in a variety of problems. Another significant advancement that was clear from the symposium was the use of molecular dynamics as a computational tool to access multiphase phenomenon that can only be addressed at the molecular scale. A good share of presentations dealing with solid particles was taken up by lattice-Boltzmann methods (LBM). It was clear that LBM has made significant advances over the last decade and offers an attractive approach to simulating complex

multiphase flow problems. The symposium showcased several other innovative numerical approaches, which offer great promise for addressing a variety of dispersed multiphase flow problems. The difficulties inherent in the fields of turbulence and multiphase flow in themselves make turbulent multiphase flow a truly grand-challenge problem. The importance of which was quite evident from the number of presentations that addressed this topic either directly or indirectly.

Two points were made abundantly clear at the IUTAM Symposium. In the first place, computational multiphase flow suscitates a strong interest in the fluid mechanics community -- a heartening corollary being that the quality of much of the work in this field is quite high. Secondly, for people like us who have been following developments in this discipline for many years, it was extremely gratifying -- and perhaps even somewhat surprising -- to gain such a palpable appreciation of the maturity of the field, its impressive development, and the level of complexity and detail that progress in hardware and algorithms currently permit. It is hard to imagine that an external observer coming to the meeting with misgivings about the usefulness of computing in multiphase flow would have left nurturing the same doubts.

c) Countries represented and number of participants

There were 48 oral presentations and an additional 17 poster papers. The symposium attracted about 90 participants from fifteen different countries. Argentina, China, France, Germany, India, Israel, Italy, Japan, The Netherlands, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

d) Publication of Proceedings of the Symposium

The proceedings of the symposium will be published as, "Computational Approaches to disperse multiphase flow, Book by Springer Science and Business Media (former Kluwer Academic Publishers), The Netherlands. Editors are S. Balachandar and A. Prosperetti.

S. Balachandar and A. Prosperetti, "Report on a Symposium on `Computational approaches to disperse multiphase flow", will appear in Int. J. Multiphase Flow, 2005.

e) Financial supports

The symposium was sponsored by the following organizations:

- International Union of Theoretical and Applied Mechanics
- Department of Energy, Office of Basic Sciences
- University of Illinois, Urbana-Champaign, IL, USA
- Johns Hopkins University, Baltimore, MD, USA
- Argonne National Laboratories
- Kluwer Academic Publishers

We are grateful for the support of our sponsors.

f) Scientific program**Monday, October 4, 2004**

Opening Lecture: J.E. Hinch, E.Guazzelli, L. Bergougnoux & Students, "*Fluctuations in the velocities of sedimenting particles*"

D.L. Koch, G. Subramanian, R. Verberg, H. Xu, and M. Louge, "*Momentum, heat and mass transport in sheared suspensions at moderate Reynolds and Stokes numbers*"

I. Eames, M. Gilbertson, J.B. Flor and V. Roig, "*Lagrangian aspects of multiphase and multibody flows*"

.B. McLaughlin, S.S. Suppiah, N. Moumen, and R.S. Subramanian, "*Molecular dynamics simulations of drop motion on uniform and non- uniform solid surfaces*"

Z.G. Feng and E.E. Michaelides, "*Proteus-a new computational scheme for deformable particles and particle interaction problems*"

A. Hölzer and M. Sommerfeld, "*Determination of resistance coefficients for non-spherical particles in laminar and turbulent flow by LBM*"

T.N. Dinh, R.R. Nourgaliev and T.G. Theofanous, "*Treatment of particle collisions and particle collective behavior in high-speed particulate flow*"

T.J. Hanratty and Y. Mito, "*Use of a stochastic method to describe dispersion and deposition*"

A. S. Sangani, K. Shah and S. Ozarkar, "*Couette flow of bubble suspensions*"

H.H. Hu and A. Perrin, "*Simulations of particulate flows using explicit MacCormack scheme*"

J.K. Eaton and J.C. Segura, "*On momentum coupling methods for calculation of turbulence attenuation in dilute particle-laden gas flows*"

T. Kajishima, "*DNS of collective behavior of solid particles in a homogeneous field - Influences of Reynolds number, loading ratio and particle rotation*"

B. Shotorban and F. Mashayek, "*On stochastic modeling of heavy particle dispersion in large-eddy simulation of two-phase turbulent flows*"

K. Squires and O. Simonin, "*Fluid-particle and particle-particle interactions in turbulent channel flow*"

M. Picciotto, A. Giusti, C. Marchioli and A. Soldati, "*Deposition, preferential distribution and resuspension of micro-particles in turbulent boundary layer*"

L.R. Collins and S.L. Rani, "*Numerical study of aerosol particle segregation in homogeneous turbulent flows*"

M. Uhlmann and A. Pinelli, "*Performance of various fluid-solid coupling methods for DNS of particulate flow*"

Tuesday, October 5, 2004

M.W. Reeks, "*Simulation of particle diffusion, segregation, and intermittency in turbulent flows*"

J. Derksen and S. Sundaresan, “A numerical study of planar wave instabilities in liquid-fluidized beds”

C.K. Aidun and E.J. Ding, “Direct simulations of particle near contact and application to dynamics of particle settlement based on the lattice-Boltzmann method”

J. Lee and A.J.C. Ladd, “Numerical simulations of particle suspensions in a rotating flow”

G. Tryggvason, J. Lu, A. Esmaeeli and S. Biswas, “Direct numerical simulation of bubbly flows”

S. Krishnan, S. Marella, H. Liu and H.S. Udaykumar, “A sharp-interface Cartesian grid method for computations of droplet impact and spreading on surfaces of arbitrary shape”

D. Lakehal and P. Liovic, “Large eddy simulation of steep water waves”

Y. Matsumoto, T. Uda and S. Takagi, “The effect of surfactant on the rising motion of a bubble”

G. Riboux, F. Risso and D. Legendre, “Liquid velocity fluctuations induced by large-Reynolds-number rising bubbles”

J. Wang, “Ultrafast X-radiography high-pressure high-speed fuel sprays”

E.K. Longmire, “Planar velocimetry measurements in particle-laden flows in support of numerical simulations”

Poster Introduction @ 7mins each

B.J. O’Donnell and B.T. Helenbrook, “Drag modeling using proper orthogonal decomposition”

T.L. Bocksell and E. Loth, “Numerical simulation of turbulent particle diffusion”

S.V. Apte, K. Mahesh, and T. Lundgren, “Accounting for finite size effects in large-eddy simulations of two-phase flows”

A. Prosperetti and Z. Zhang, “The PHYSALIS method for the numerical simulation of fluid-particle interaction”

R. IJzermans, R. Hagmeijer, H. Hoeijmakers, “Particle accumulation in high-speed swirling disperse multiphase flow”

C. Narayanan and D. Lakehal, “Preferential accumulation of particles and mechanisms of particle-phase fluctuation generation in turbulent mixing layers”

T.M. Burton, “Investigation of point force turbulence modification”

M. Cantero, S. Balachandar, M. Garcia, J. Ferry, “Large scale simulations of cylindrical particulate density currents using equilibrium Eulerian approach”

G. Pianet, E. Arquis and S. Vincent, “3D instationary simulation of particle sedimentation toward high regimes”

J.R. Schmidt, J.O.L. Wendt and A.R. Kerstein, “Prediction of particle-laden turbulent channel flow using one dimensional turbulence”

C. You and Y. Qiu, “Numerical simulations of viscous. Incompressible flows using meshless method”

Wednesday, October 6, 2004

- V.K. Dhir, “*Numerical simulation of evolving and merging vapor-liquid interfaces during nucleate boiling*”
- S. Chen, X. Nie and M. Robbins, “*Multiscale simulation of micro- and nano-fluidics*”
- M.R. Maxey, D. Liu, S. Dong and G.E. Karniadakis, “*New advances in force-coupling method: from micro to macro*”
- N.A. Patankar, N. Sharma and Y. Chen, “*Direct numerical simulation of the Brownian motion of particles using fluctuating hydrodynamic equations*”
- S. Zaleski, “*High resolution simulations of two-phase mixing layers and ligament formation*”
- J.S. Curtis, “*Gas-particle flows: some next steps in CFD model development*”
- E. Meiburg, F. Necker, C. Haertel, and L. Kleiser, “*High resolution simulations of particle-driven gravity currents*”
- S. Elghobashi, “*On the drag reduction in a microbubble-laden spatially-developing turbulent boundary layer*”
- R.R. Nourgaliev, T.N. Dinh, and T.G. Theofanous, “*The “Characteristics-Based Matching (CBM)” method for treatment of high-impedance interfaces in compressible disperse multiphase flows*”

Poster Introductions @ 7mins each

- X. Li and K. Sarkar, “*Finite Reynolds number two-phase flow with drops*”
- J.C. Wells, H.V. Truong and G. Tryggvason, “*Use of variable-density flow solvers for fictitious-domain computations of dispersed solid particles in turbulent flows*”
- M. Muradoglu and M.B. Soydan, “*Computational modeling of bio-fluid mechanics of white blood cells*”
- C.F. Delale, S. Nas and G. Tryggvason, “*Numerical simulation of shock propagation in bubbly liquids by the front tracking method*”
- J.M. Pérez and A. Pinelli, “*Evaluation of closure laws for the Eulerian formulation of fluid-solid flows through linear stability analysis*”
- P. Singh and D.D. Joseph, “*Fluid dynamics of floating particles*”
- T.N. Randrianarivelo, S. Vincent, O. Simonin and J.P. Caltagirone, “*A direct numerical simulation approach dedicated to the analysis of 2D fluidized beds*”
- M. Muradoglu, U. Olgac and A.D. Kayaalp, “*A finite-volume/front-tracking method for computations of dispersed multiphase flows in complex geometries*”

Thursday, October 7, 2004

- L.M. Portela, “*Simulation of dispersed multiphase flows using near-far field decomposition techniques*”
- V. Badalassi and S. Banerjee, “*Dispersed phase coarsening of phase-separating binary fluids under shear*”
- V. Kumaran, “*Dynamics of the particle phase in a turbulent gas-solid suspension*”

S. Takagi, G. Kikugawa and Y. Matsumoto, "*A molecular dynamic study on the energy structure of nanobubbles*"

J. Bec, "*Multifractal clusters of inertial particles in smooth flows*"

J. Brady, "*From proteins to peas: diffusion across scales*"

J. Magnaudet, "*Struggling with boundary layers and wakes of high-Reynolds-number bubbles*"

T.G. Theofanous, T.N. Dinh and R.R. Nourgaliev, "*Compressible multi-hydrodynamics: emergent needs, approaches and status*"

Closing Lecture: B.H. Yang, J. Wang, D.D. Joseph, H.H. Hu, T.W. Pan and R. Glowinski, "*Migration of a sphere in tube flow*"

Report composed by S. Balachandran

**04-8 IUTAM Symposium on Elementary Vortices and Coherent Structures: Significance in Turbulence Dynamics
Kyoto, Japan, October 26-28, 2004**

a) Scientific Committee

S.Kida (Chairman, Japan), M.E.Brachet (France), M.S.Chong (Australia), F.Hussain (U.S.A.), J.Jimenez (Spain), T.Miyauchi (Japan), K.Moffatt (U.K.), D.Pullin (U.S.A.)

b) Short summary of scientific progress achieved

By the elementary vortices, we mean those tubular swirling vortical structures with concentrated vorticity which are commonly observed in various kinds of turbulent flows as the smallest coherent structure. The elementary vortices play key roles in turbulence dynamics (e.g. enhancement of mixing, diffusion and resistance) and characterizes turbulence statistics (e.g. intermittency). They tend to gather into larger and stronger coherent vertical motions (e.g. spanwise rollers in free shear flows and hairpin vortices in wall-bounded flows). There are dynamical and statistical similarities between small- and large-scale vertical motions (e.g. formation and structure of tornadoes and trailing vortices from aircrafts). Because of their dynamical importance, manipulation of elementary vortices and coherent structures is expected to be effective and useful in turbulence control as well as in construction of turbulence modeling. Besides its dynamical significance, the vortical structure is convenient in describing and understanding turbulence structure such as skeleton representation by vortex axes, and the topological characterization by knottedness and crossing number. In this symposium, new perspectives in theory, prediction, and control of turbulence have been developed with the vortical structures as the core concept. The topics chosen for the sessions include 'Dynamics and structures of turbulent flows', 'Chaotic advection and mixing', 'Statistical properties of turbulence', 'Mathematical aspects of fluid equations'. There were 21 oral presentations (including 5 keynote lectures) and 21 poster presentations.

c) Countries represented and number of participants

The meeting attracted 79 participants from 11 countries: Australia (1), Czechoslovakia (1), France (6), Israel (1), Italy (1), Japan (53), Poland (1), Russia (1), Spain (1), United Kingdom (5), United States (9).

d) Publication of Proceedings of the Symposium

The proceedings of selected papers in the symposium will be published in a Proceedings Book by Springer Publishers. Editors are S. Kida, M. Yamada and S. Yoden.

e) Financial supports

The organizers extend their thanks to the following for sponsorship of this IUTAM symposium:

- International Union of Theoretical and Applied Mechanics.
- The Commemorative Organization for the Japan World Exposition ('70),
- Inoue Foundation for Science,
- The 21st Century COE Programs for Research and Education on Complex Functional Mechanical Systems, for Elucidation of the Active Geosphere (KAGI21), for Formation of an International Center of Excellence in the Frontiers of Mathematics and Fostering of Researchers in Future Generations, and for Center for Diversity and Universality in Physics.

f) Scientific program**October 26, 2004****Sectional lecture**

J. Jiménez, G. Kawahara, M.P. Simens, *The near-wall structures of turbulent wall flows*

Regular lectures

T. Miyauchi, S.-J. Kang, M. Tanahashi, *Coherent fine scale eddies in the logarithmic region of turbulent channel flows*

P. Orlandi, S. Leonardi, R.A. Antonia, *Vortex structures in a rough-wall channel flow and their influence on heat transfer*

Sectional lecture

J.C. Vassilicos, J. Davila, S. Goto, E. Hascoet, D. Osborne, L. Rossi, *Persistent multiple-scale stagnation point structure*

Regular lectures

S. Goto, J.C. Vassilicos, *Streamlines, coherent vortices and particle pair diffusion in two-dimensional turbulence*

M. Nishioka, S. Sakaue, K. Komada, H. Sakoshi, I. Furukawa, *On the mixing transition in supersonic streamwise vortices*

F. Moisy, J. Jiménez, *Geometry and clustering of intense structures in isotropic turbulence*

J.G. Brasseur, W. Lin, *Influence of mean shear on the dynamics of turbulent vorticity and strain-rate*

Y. Tsuji, T. Ishihara, *Statistical property of pressure fluctuation in fully developed turbulence*

Y. Cuypers, P. Petitjeans, A. Maurel, *The turbulent energy cascade built by a vortex burst*

M.S. Chong, M. Giacobello, A. Ooi, *Invariants of the velocity gradient tensor in eddying motion and turbulence.*

October 27, 2004

Poster presentations

K. Horiuti, Y. Takagi, S. Abe, *Multi modes for the vortex sheet-tube transformation process and viscoelastic effect*

M. Asai, Y. Konishi, *Instability of low-speed streaks leading to wall turbulence*

T. Ogasawara, S. Toh, *Self-similarity of ballistic motion in turbulent relative dispersion*

Y. Sakai, H. Kuwahara, K. Maeyama, H. Tsunoda, *Study on the two-particle diffusion and the fine-scale structures of turbulence by DNS*

P. Otheguy, P. Billant, J.-M. Chomaz, *Instability of corotating vertical vortices in a stratified fluid*

Y. Kitamura, Y. Matsuda, *Energy cascade processes in stratified turbulence*

Y. Kaga, S. Yanase, *Action of coherent vortices in rotating duct flows*

J.E. Ruppert-Felsot, M. Caldoro, M. Farge, K. Schneider, H.L. Swinney, *Coherent structures in rotating turbulent flow: laboratory and numerical experiments*

J. Hasegawa, K. Ishioka, S. Yoden, *Asymmetrization of jet profiles in b-plane turbulence*

T. Mashiko, Y. Tsuji, M. Sano, *Dynamics of velocity field in developed thermal turbulence*

T. Watanabe, T. Gotoh, *Intermittency, field structures and accuracy of DNS in a passive scalar turbulence*

P. Chakraborty, S. Balachandar, R.J. Adrian, *Local vortex identification criteria: Formulation, inter-relationships and issues*

A.-k. Xiong, K. Kobayashi, S. Izawa, Y. Fukunishi, *Discussions on the methods for vortex identification*

K. Fukuda, K. Kamemoto, *A grid-free redistribution model for a vortex method and turbulent flow analysis*

H. Mouri, A. Hori, Y. Kawashima, *Vortex tubes in velocity fields of laboratory turbulence at high Reynolds numbers*

T. Iwayama, T.G. Shepherd, *Self-similarity of vorticity dynamics in decaying two-dimensional turbulence*

K. Bajer, M. Branicki, *Flow due to a point vortex in oscillating ambient strain*

T. Sakajo, *Motion of unstable polygonal ring of vortex points on sphere with pole vortices*

A. Mitani, M. Tsubota, W.F. Vinen, *Decay of quantum turbulence by Kelvin wave cascade*

L. Skrbek, *Flow phase diagram for the helium superfluids*

S.K. Nemirovskii, M. Tsubota, *Trial distribution functional of vortex tangle in superfluid helium*

Regular lecture

E. Sharon, *Experimental study of rotating turbulence - The effect of coherent structures on statistics and dynamics*

Sectional lecture

M. Tsubota, *Superfluid turbulence and dynamics of quantized vortices*

Regular lectures

D. Dritschel, *A new twist to rotating stratified turbulence*

Y.K. Sasaki, *Tornadic vortex in the atmosphere: Observation, structure, genesis theory and numerical simulation*

J.-M. Chomaz, F. Gallaire, *Spatio-temporal instabilities and breakdown of swirling flows*

J.M. Faddy, D.I. Pullin, *Evolution of vortex structure in a model of the turbulent trailing vortex*

N. Takahashi, T. Miyazaki, *Interaction between a columnar vortex and external turbulence*

October 28, 2004**Sectional lecture**

P. Constantin, *Reconnection studies and sub-grid models*

Regular lectures

L. van Veen, S. Kida, G. Kawahara, *Periodic motion in high symmetric flow*

T. Itano, S. Toh, *Co-supporting cycle of a large-scale structure and near-wall structures in wall turbulence*

Y. Kimura, *Motion of 3D vortex filament and particle transport*

Sectional lecture

U. Frisch, J. Bec, W. Pauls, T. Matsumoto, *The analytic structure of Euler flow*

Regular lectures

R.M. Kerr, *What role for helicity in vortex reconnection?*

M.-E. Brachet, C. Cichowlas, *Singularities and Kolmogorov scaling in 3-D incompressible inviscid flows with spectral truncation*

Y. Fukumoto, Y. Hattori, *Linear and nonlinear instability of a vortex ring*

Report composed by Shigeo Kida

**04-9 IUTAM Symposium on Laminar-Turbulent Transition
Bangalore, India, December 13-17, 2004****a) Scientific Committee**

Rama Govindarajan (Chair, INDIA), Roddam Narasimha (IUTAM Representative), Daniel Arnal (France), Mike Gaster (United Kingdom), Leonhard Kleiser (Switzerland), Y. P. Kohama (Japan), William Saric (U.S.A), H. Zhou (China)

b) Short summary of scientific progress achieved

The sixth IUTAM meeting in the series, which was held at Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India, focused on the progress after the fifth meeting held at Sedona in 1999. The symposium adhered to the IUTAM format of single session. The symposium included seven invited lectures, fifty oral presentations and eight posters.

During the course of the symposium, the following became evident. The area of laminar-turbulent transition has progressed considerably since 1999. Better theoretical tools, for handling nonlinearities as well as transient behaviour are now available. This is accompanied by an enormous increase in the level of sophistication of both experiments and direct numerical simulations. The result has been that our understanding of the early stages of the transition process is now on much firmer footing and we are now able to study many aspects of the later stages of the transition process. Consequently, considerable light was thrown during the symposium on, e.g., the role of streamwise streaks, flow separation, complex geometry, turbulent spots etc. We are also now capable of better approaches to flow control.

The immediate future is likely to see important advances in this area and it is hoped that the symposium has added momentum to this effort. From the high level of interactions during the conference and the feedback from participants, it seems likely that this is the case. Therefore the symposium achieved its purpose.

I would like to sincerely thank the IUTAM for giving me the opportunity to organize and chair this event and also for generous financial support.

c) Countries represented and number of participants

The meeting attracted 113 participants from 15 countries:

Brazil (1), Canada (1), China (2), France (5), Germany (9), India (49), Israel (2), Japan (12), Malaysia (1), Russia (4), Spain (1), Sweden (6), Switzerland (3), The Netherlands (1), United Kingdom (11) and USA (5).

d) Publication of Proceedings of the Symposium

The papers presented at this symposium are to be published by Kluwer - Springer Academic Publishers, The Netherlands in the volume "Laminar-Turbulent Transition". The final version of the proceedings is in preparation.

e) Financial supports

We are grateful to our sponsors listed below who have supported the various activities of the symposium.

- International Union of Theoretical and Applied Mechanics, Russia
- Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
- Pratt & Whitney - A United Technologies Company, CT – USA
- US Air Force Office of Scientific Research, Asian Office of Aerospace Research & Development, Japan
- Council of Scientific and Industrial Research, Human Resource Development Group, Government of India
- Defence Research & Development Organization, Government of India
- Hindustan Aeronautics Limited, Bangalore, India
- Indian National Science Academy, Government of India
- Department of Science & Technology, Ministry of Science & Technology-India
- Hitech Engineering Equipments, Bangalore, India
- Real Time Tech Solutions, Private Limited, Bangalore, India

f) Scientific program**Day 1**

Opening lecture: Mike Gaster, *Laminar separation bubbles*

Instability I

Vassilis Theofilis, *On fundamental instability mechanisms of nominally two-dimensional separation bubbles*

Gregoire Casalis, *Global instability of the flow induced by wall injections*

Flow control I

Ardeshir Hanifi, *Optimal suction design for hybrid laminar flow control*

Seichihiro Izawa, *Transition control in a flat-plate boundary layer*

Jerome Hoepffner, *Linear feedback control of transition in shear flows*

Manikandan Mathur, *Effect of ambient viscosity on the entrainment and dynamics of a buoyant jet*

Instability II

Invited lecture: Dan Henningson, *Transient growth with application to bypass transition*

VV Kozlov, *Development of forerunners on fronts of longitudinal structures in the boundary layer*

B Hof, *First observation of coherent travelling wave states in experimental pipe flow*

Transition I

H Zhou, *Inherent mechanism for laminar-turbulent transition*

Gilles Studer, *Experimental and numerical analysis of unsteady boundary layer transition using continuous wavelet transform*

Stefan Hein, *Nonlinear nonlocal analysis of crossflow dominated transition scenarios using DNS-like resolution*

Transition II

Toshiaki Kenchi, *The effect of length scale of free stream turbulence on boundary layer transition*

Ulrich Rist, *Unsteady disturbance generation and amplification in the boundary-layer flow behind a medium-sized roughness element*

Day 2

Transition III

Invited lecture: Xuesong Wu, *The role of free-stream disturbances in laminar-turbulent transition*

Jens Fransson, *Experimental study of the stabilization of Tollmien-Schlichting waves by finite amplitude streaks*

Masahito Asai, *Development of streamwise streaks in a quasi-laminar boundary layer downstreams of localized suction*

Instability III

J J Healey, *A new convective instability with growth normal to a boundary layer*

Luca Brandt, *Numerical studies of streak instability in boundary layers*

Kirti Sahu, *A possible linear instability mechanism in small-scale pipe flows*

JP Gostelow, *Effects of strong adverse pressure gradients and incident wakes on transition and calming*

Invited lecture: Jeffrey D Crouch, *Modeling the effects of two-dimensional steps on transition due to Tollmien-Schlichting waves*

Compressible Flow

N Semionov, *Experimental study of turbulence beginning and transition control in a supersonic boundary layer on a swept wing*

Christian Stemmer, *Transition investigations on hypersonic flat-plate boundary layer flows with chemical and thermal non-equilibrium*

Cross Flow

Shohei Takagi, *Characteristics of unsteady disturbances due to streamline-curvature instability in a three-dimensional boundary layer*

V Krishnan, *Observations of crossflow transition on a swept wing with GAW-2 airfoil section*

Flow Control

C Davies, *Disturbance developments in boundary layers over compliant surfaces*

PK Sen, *Suppression of wall turbulence based on stability and turbulence analysis using compliant surfaces*

Meelan Choudhari, *A computational study of roughness-induced transient growth*

Mattias Chevalier, *Linear control and estimation in boundary layer flows*

Day 3

Transition IV

Invited lecture: Tom Mullin, *Recent observations in the transition to turbulence in a pipe*

Patrice LeGal, *Transition to turbulence of the torsional Couette flow*

Marcello Medeiros, *A mechanism of production of sub harmonic waves in nonlinear wave packets in boundary layers*

Philipp Schlatter, *Applicability of LES models for prediction of transitional flow structures*

Transition V

L Krishnan, *Turbulent spots in a compressible boundary-layer flow*

Tal Yehoshua, *Evolution of vortices ejected from zero-mass-flux actuator into cross-flow*

Rajat Mittal, *Resonant mode interaction and transition in a canonical separated flow*

Paresh Chokshi, *Stability and transition in the flow of polymer solutions*

Instability IV

Invited lecture: Jaywant Arakeri, *Localised instability in unsteady separation bubbles*

Pierre Ricco, *Effect of free-stream turbulence on a compressible laminar boundary layer*

A Sameen, *Effect of viscosity stratification on secondary and nonmodal instabilities*

Michael Broadhurst, *Spectral element stability analysis of vortical flows*

Instability V

Dieter Sartorius, *Experimental study of resonant interactions of instability waves in an airfoil boundary layer*

Peter Carpenter, *Klebanoff modes in swept boundary layers*

Joern Sesterhenn, *Effects of compressibility and nose radius on instabilities near the attachment line of swept wings*

Day 4

Flow Control III

Sanjay Mittal, *Effect of elastic supports on the critical value of Reynolds number past a cylinder*

Yasuaki Kohama, *Improvement of lift-to-drag ratio of the artificially generated instabilities on a laminar flow airfoil*

Separated flow

Wolfgang Rodi, *DNS of separation-induced transition under the influence of distributed and concentrated free-stream fluctuations*

Tilmann Hetsch, *The effect of sweep angle on laminar separation bubbles*

ON Ramesh, *On the bursting criterion for laminar separation bubble*

Instability VI

Christophe J Robinet, *Two-dimensional local instability: complete eigen value spectrum*

Jitesh Gajjar, *Instability of flow past a cascade of circular cylinders*

Sriram Hegde, *A wave driver theory for vertical waves propagating across junctions between rigid and compliant walls*

Closing lecture: Hermann Fasel, *DNS including control of transition/separation*

Report composed by Rama Govindarajan and Anjana Krishnaswamy.

Report of the IUTAM Summer School held in 2004

Report on the third IUTAM Summer School on Biomechanics of Cells and Molecules

Beijing, China, July 12-17, 2004

a) Organization

The IUTAM summer school on “Biomechanics of Cells and Molecules” was held at Peking University in Beijing, from July 12 to July 17, 2004. The summer school was hosted by Department of Mechanics and Engineering Science of Peking University.

b) Lecturers

The summer school was taught by the following principal lectures:
Professor Deborah E. Leckband, University of Illinois at Urbana-Champaign, USA
Professor Zhong-Can Ouyang, Chinese Academy of Science, China
Professor Michael P. Sheetz, Columbia University, USA
Professor Cheng Zhu, Georgia Institute of Technology, USA
Professor Van C. Mow, Columbia University, USA
Professor Mian Long Chinese Academy of Science, China
Professor Cheng Dong, Pennsylvania State University, USA

c) Summer School topics

The topics covered by the main lectures included:
Intermolecular and Inter-surface Forces in Biology (D.E. Leckband)
Molecular Mechanics of Membranes and the Cytoskeleton, Engineering of Cell Motility (M.P. Sheetz)
Kinetics and Mechanics of Single Molecules and Single Molecular Interactions (C. Zhu)
Elastic Theory of Fluid Biomembranes and Single-Molecule DNA/RNA (Z.C. Ouyang)
Influence of Tension-Compression Nonlinearity on the Mechano- Electrochemical Environment of Chondrocytes in Cartilage Explants (V C. Mow)
Molecular Biomechanics of Receptor-Ligand Bonds (M Long)
Hemodynamic Modulation of Tumor Cell Extravasation: Intercellular and Intracellular Interactions (C. Dong)

d) Participants

Over 90 participants from 11 Chinese research institutes and universities attended the summer school.

e) Scientific output

The summer school introduced the attendees to the research fields and current trends of biomechanics of cells and molecules, not only to help researchers to understand quantitatively the structure-function relationship of cells and biologically active molecules, but also to provide methodological and technical supports to the researches of biomechanics and biomedical engineering. The excellent lectures and discussions promoted the academic exchanges among the scholars and students, and were helpful for the fundamental researches and applications in this field.

f) Publication of Proceedings of the Summer School

Abstracts of the lectures were collected and distributed to the attendees during the summer school. Some related references and discussions were presented in a related website for the students.

g) Financial support

The summer school was co-sponsored and supported by IUTAM, The National Natural Science Foundation of China, the Chinese Society of Theoretical and Applied Mechanics and Peking University.

Report composed by Jing Fang

Reports of the IUTAM Working Parties

WP-1 - Non-Newtonian Fluid Mechanics and Rheology

Members

Chair: Prof. J.R.A. (Anthony) Pearson, Additional members: Prof. D.V. (David) Boger, Prof. R. (Roland) Keunings, Prof. L.G. (Gary) Leal.

No report submitted by WP-1 for the IUTAM Report 2004.

WP-2 - Dynamical Systems and Mechatronics

Members

Chair: Prof. F. (Friedrich) Pfeiffer, Additional members: Prof. F.L. (Felix) Chernousko Prof. R.S. (Robin) Sharp, Prof. M. (M.) Tomizuka

Definition

The synergetic integration of physical (mechanical) systems, decision making and information technologies in design, manufacture and operation of plants, structures, machines or processes with respect to system dynamics and control and with the goal of better system performance.

Characterisation

Physical (mechanical) systems of concern are mainly assemblies of subsystems with measurable and sometimes predictable behavioural properties, the latter through models and their correct mathematical representation. The process of modelling physical, or more specifically mechanical systems definitely is more an art than a science and follows aspects like engineering experience and intuition. This process is the main key for a success in a sense, that the model should represent reality as good as possible.

Mechanical and mathematical models for components and subsystems are hugely developed, but experimental verification is often very poor or non-existent. This is already true for components, it is the more true for large systems. Therefore we obviously still have a need for new requirements. Multibody system analysis software has made many analyses of large systems relatively straightforward but distributed flexibility, variable boundaries and time-varying features continue to pose problems. Analytical solutions, even in an approximate sense, are only possible for smaller or for linear systems giving some insight in parameter dependencies, but, in general, they do not extend to systems of both high order and of difficult and generally nonlinear forms. Modelling becomes worse for continuum systems governed by partial differential equations, and in spite of many nice mathematical concepts their combination with control and information technologies is still extremely difficult, both, theoretically and

practically. The problems with respect to parameter dependencies, to sensitivities concerning initial conditions and to steady state numeric include many open questions.

On the other hand, numerical solutions are generally achievable and, as computers become more powerful, they become less costly to obtain. Modelling and simulation are at the core of contemporary studies for systems analysis. Capability in analysis naturally leads to (virtual systems) optimisation and later to optimal system synthesis. Evaluating large systems including a physical (mechanical) subsystem of large order and including further on large control and decision making subsystems usually requires today co-simulations of very large computer codes with all the problems of numerical stability and integration algorithms. First order models of even complex systems may be quite easily obtained and solved but they may not be useful practically. At least from an engineering point of view a strict correspondence of theory and practice is mandatory. Very detailed and accurate models are likely to be needed for practical purposes, which require a deep physical understanding of the system under consideration.

The most relevant information technology is from control theory, which is very highly developed. Much contemporary work involves the application of advanced topics in control, optimal control, nonlinear control with constraints, robust control, predictive control and the like to systems of ever increasing complexity. A recurring theme is "how should one deal with such increasing levels of complexity?". The control theory itself does not answer to this question. Mechatronics addresses issues important in implementing control laws provided by the theory on actual systems by utilizing digital signal processors, sensors and actuation devices. In trying to optimise systems, studies must address not only control issues but also issues of reliability, fault tolerance and failure modes. This indicates an aspect of system design, which will be with us for ever. In this sense, mechatronics is nothing but the best practice for designing systems.

Mixed hardware and software systems are of interest, for example in the case of "hardware-in-the-loop" tests. In such cases, devices with more complex and uncertain behaviour are included in system studies as they are, with interfacing to the remaining "virtual" system. An important sub-class of uncertain systems concerns the human operator. Man-machine interaction problems demand special treatments of the human component.

Research areas with a good future

- Dynamics and control of multibody systems including distributed flexibilities, additional bilateral and unilateral constraints of non-smooth character.
- Non-linear vibration advances and applications.
- Mathematical advances with application to high order nonlinear systems, including also systems of practical significance.

- Advancement of techniques for modelling difficult system features like impacts, energy dissipation in structures and assemblies through friction and hysteresis, hydraulic flows, high frequency effects (waves, rate dependent material properties) etc.
- New methods for control of mechanical and mechatronic systems
- Simultaneous optimisation of system design and control.
- Advancements in parameter identification and state estimation.
- Methods for dealing with ever increasing system complexity of integrated mechatronical systems including physics (mechanics), control and information technologies.
- Methods for faster, more accurate, more reliable numerical solution of describing equations, parameter optimisation, large system synthesis etc. This includes also methods for capitalising on problem features like multi-time-scale dynamics.
- Man-machine interaction problems – car driving, bike riding, aircraft piloting, pilot induced oscillations, pilot – helicopter interaction failures.
- Application studies in robotics, space exploration, transportation, micro-systems especially medical and computational, mechatronic “smart” structures, power transmission, machine optimisation and synthesis.

Report composed by Friedrich Pfeiffer (collecting the contributions of all members)

WP-3 - Mechanics of Materials

Members

Chair: Prof. S.R. (Sol) Bodner, Additional members: Prof. C.T. (Carl) Herakovich, Prof. T. (Tatsuo) Inoue, Prof. J.B. (Jean-Baptiste) Leblond.

With reference to the pre-nominated sessions of ICTAM 2004, the interests of WP3 cover about half the number and are central to the field of Mechanics. The organizations affiliated with IUTAM that are primarily related to WP3 are the International Congress on the Mechanical Behaviour of Materials (ICM) and the International Congress on Fracture (ICF). Two members of WP3 are on the governing board of ICM and helped to organize ICM-9, which was held in Geneva in May 2003. A report on that conference was submitted to IUTAM. The Mechanics content of this conference was enhanced compared to earlier ones. The next conference of ICF will be held in Torino, Italy, March 2005.

In response to a request by the Chairman of WP3 to its members to suggest new subjects for possible pre-nominated sessions for future congresses, the following were offered:

- * Dynamic fracture mechanics (experiments and models)
- * Ductile fracture
- * Crack paths in brittle fracture

These suggested topics will be brought to the attention of the Congress Committee.

Report composed by Sol Bodner

WP-4 - Materials Processing

Members

Chair: Prof. R.M. (Robert) McMeeking, Additional members: Prof. S. (Shigeo) Asai, Prof. C.W. (Christopher) Macosko, Prof. R. (René) Moreau.

No report submitted by WP-4 for the IUTAM Report 2004.

WP-5 - Computational Fluid and Solid Mechanics

Members

Chair: Prof. E.R. (Eduardo) de Arantes e Oliveira, Additional members: Prof. Y.K. Cheung, Prof. J. (Jacob) Fish, Dr. S. R. (Sergio) Idelsohn, Prof. P. (Pierre) Ladevèze, Prof. J.T. (John Tinsley) Oden.

The WP5 is different from most of the remaining WPs because so many meetings on computational methods are being organized on the field all over the World. Not just small meetings, but large meetings as well. If we consider the American national congresses as world meetings, as indeed they became, a world meeting is held every year. In the Summer of 2004, two large congresses world Congresses were held: the ICTAM in Warsaw (which, of course, was far from being devoted entirely to Computational Mechanics) and the IACM World Congress in Beijing. They were both very successful.

We must be careful in not contributing to exaggerate the number of meetings. The idea that such number is regulated by scientific offer & demand is a fallacy. However, the WP5 should encourage some (not all) kinds of meetings. I give some examples:

1. Last March 17th, I received a Call for Mini-symposium Proposals in the Seventh World Congress on Computational Mechanics, which will take place next year in Los Angeles. I think that WP5 should sponsor some of these symposia.

2. In some countries, it is not easy for the organisers to find money to invite key-note lecturers and to support the participation of young scientists of the country itself in international meetings held in the country itself. This is the case of China (where meetings as the IUTAM World Congress in Beijing are the exception, not the rule). This may also be the case in India, in Indonesia, and in Latin America, as well.
3. Africa is of course at a low stage of scientific development, but I think it is time to conceive a strategy for Africa. I expect Prof. Pierre Ladevèze to help me in this matter, and may be Prof. Keith Moffat will be willing to give us some ideas.
4. In what concerns Europe and North America, some may think that we should not worry much about. Indeed, most of the meetings take place there. I think, however, that, in the developed world, a more imaginative action is needed to cover some subjects that are not usually covered. I will explain what I mean.

Let us go back to last September 2004. I didn't promote a WP5 meeting in Beijing, although I had expected to do that. Good reasons for not promoting such meeting were: i) Tinsley Oden, whose presence in the meetings is always so relevant, was absent; ii) the composition of the Working Party was about to be deeply changed. Indeed, Ted Belytschko wished, unfortunately, to leave the team and was expected to be replaced by another American: Jacob Fish. On the other hand, we had decided to propose to IUTAM a second European member: Pierre Ladevèze. However, although a formal meeting didn't take place, bilateral talks were promoted with all the members of the WP5 present in Beijing, and also with Jacob Fish (Ladevèze was not in Beijing) who was supposed to become one of the newcomers, trying to explain why IUTAM and IACM have distinct roles in the international organisation of Science, although: i) stiff boundaries are to be avoided; ii) different styles have to be tolerated. I tried to explain my views about why there is a need for a link - WP5 - between both organisations.

I believe that the fact that stiff boundaries have to be avoided is just the point that may provide a more imaginative action. Indeed, the interesting topics emerge in the interfaces.

These bilateral talks in Beijing were supported by a general scheme from which I do not feel the need to present a graphic presentation. In this scheme, not two (IUTAM and IACM) organisations were considered but five, as ICSU, IMU, and IUPAP, also were added. The presence of ICSU in the scheme is obvious. In what concerns IMU, its connections with IUTAM have been a fact in the past. I do not think, however, that the relations between IUTAM and IUPAP have been so traditional.

One of the ideas in Beijing was that "Engineering Mechanics" tends to be replaced by something much more general: "Engineering Science". Indeed, "Computational Mechanics", which has to do with Newton/Euler's equations, tends to be extended - as the technological reality has to be modelled by more and more complex mathematical models -, to "Computational Science", in which Maxwell's equations also play a role. This is not a vision of the mind, but is determined by the technological pull. I hope that the primacy of Mechanics in "Computational Science" is not a mere wishful thinking.

Subjects as the "Philosophy and Methodology of Science" and the "Global Organisation and Synthesis of the Scientific Knowledge" certainly overlap the frontiers between ICSU and IUTAM, or ICSU and IUPAP, or IUTAM and IUPAP. Subjects as "Validation by Experiments and by Observation of Nature" are above the interface between IUTAM (or IUPAP) and IACM. But "Mathematical Modelling", and even "Physical Modelling", belong both to IUTAM (or IUPAP) and IACM. "Computational Techniques" belong to the core of IACM, but should not be refused, I think, in an IUTAM (or an IUPAP) meeting. "Technological Applications" fall within the scope of IACM.

I intend to propose to WP5 to encourage these kind of meetings, and to try to exploit the interfaces between IACM and "Engineering Science", even in topics that are not of a purely mechanical nature. In what concerns meetings of the Working Party, I expect to promote one in 2005 during the next 8th American National Congress on Computational Mechanics, which will be held in Austin, Texas.

Report composed by E. R. de Arantes e Oliveira

WP-6 – Biomechanics

Members

Chair: Prof. D. (Dominique) Barthès-Biesel, Additional members: Prof. J.E. (Joan) Bechtold, Dr. G.A. (Gerhard) Holzapfel, Prof. K. (Kazuo) Tanishita.

No report submitted by WP-6 for the IUTAM Report 2004.

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

Members

Chair: Prof. W. (Wei) Yang, Additional members: Prof. F. (Fernand) Ellyin, Prof. Y. (Yonggang) Huang, Prof. M.G. (Grae) Worster.

No report submitted by WP-7 for the IUTAM Report 2004.

WP-8 – Geophysical and Environmental Mechanics

Members

Chair: Prof. P.F. (Paul) Linden, Additional members: Prof. H. (Hervé) Le Treut, Prof. J.W. (John) Rudnicki, Prof. J. Srinivasan, Dr. P. (Luis) Thomas.

No report submitted by WP-8 for the IUTAM Report 2004.

WP-9 - Education in Mechanics and Capacity Building**Members**

Chair: vacancy, Additional members: Prof. H. (Hassan) Aref, Prof. Y. (Yi-long) Bai, Prof. M.H.A. (Mohammed) Hassan.

No report submitted by WP-9 for the IUTAM Report 2004.

ICTAM 2004 Warsaw**Local Organizing Committee**

President and Chairman: Witold Gutkowski, Co-Chairmen: Michał Kleiber & Włodzimierz Kurnik, Secretary General: Tomasz Kowalewski

The 21st International Congress of Theoretical and Applied Mechanics (ICTAM04) took place August 15-21, 2004, in Warsaw, Poland. It was organized by Polish National Committee of IUTAM, Institute of Fundamental Technological Research of the Polish Academy of Sciences (IPPT PAN) and Warsaw University of Technology. The Congress venue was the main building of Warsaw University of Technology. The scientific program of the meeting consisted of plenary opening and closing lectures, sectional lectures, mini-symposia, and contributed papers presented in lecture and seminar presentation sessions. These were intended to cover all aspects of mechanics.

Special Lectures, Mini-Symposia and Pre-nominated Sessions**General Lectures:**

Opening Lecture: Leen van Wijngaarden (Netherlands): Interplay between air and water

Closing Lecture: Kazimierz Sobczyk (Poland): Stochastic dynamics of engineering systems

Sectional Lectures:

Jorge Ambrosio (Portugal): Multibody dynamics: bridging multidisciplinary applications
Konrad Bajer (Poland): Rapid formation of strong gradients and diffusion in the transport of scalar and vector fields

Daniel Beysens (France): Near-critical point hydrodynamics and microgravity

John F. Brady (USA): Suspensions: from micromechanics to macroscopic behaviour

Huajian Gao (Germany): Nanoscale mechanics of biological materials

Tom J. R. Hughes (USA): Variational and multiscale methods in turbulence

Roland Keunings (Belgium): Non-Newtonian fluid mechanics using molecular theory

Edwin Kreuzer (Germany): Nonlinear dynamics in ocean engineering

Pierre Ladevèze (France): A bridge between the micro- and mesomechanics of laminates: fantasy or reality

Marcel Lesieur (France): Turbulence and large-eddy simulations
 Anatoly Neishtadt (Russia): Probability phenomena in perturbed dynamical systems
 Raymond W. Ogden (UK): Mechanics of rubberlike solids
 André Preumont (Belgium): Some issues in active vibration control of smart structures
 Peter B. Rhines (USA): Ocean circulation and its influence on climate
 Erich Sackmann (Germany): Microviscoelasticity of cells: cells as viscoplastic bodies
 Dudley A. Saville (USA): Electrokinetics & electrohydrodynamics in microfluidics
 Edward A. Spiegel (USA): Problems in astrophysical fluid dynamics
 Harry L. Swinney (USA): Scaling in quasi-2D turbulence experiments in a rotating flow

Mini-Symposia:

MS1. Smart materials and structures

N. Sottos (USA) – Chair; J. Holnicki-Szulc (Poland) – Co-Chair

Introductory Lectures:

R. D. James (USA) A way to search for smart materials with unprecedented physical properties

W. Ostachowicz (Poland) Elastic wave propagation development for structural health monitoring

S. R. White (USA) Autonomic healing of polymers and composites

MS2. Tissue, cellular and molecular biomechanics

P. Janmey (USA) – Chair; D. Barthès-Biesel (France), A. Hoger (USA) – Co-Chairs

Introductory Lectures:

S. Margulies (USA) Tissue mechanics

S. Safran (Israel) Elastic interactions of biological cells

C. Schmidt (Netherlands) Molecular mechanics cytoskeletal components

MS3. Mechanics of thin films and nanostructures

K.S. Kim (USA) – Chair; Z. Suo (USA), H.M. Jensen (Denmark) – Co-Chairs

Introductory lectures:

H. M. Jensen (Denmark) Mechanics of thin film structures

R Ruoff (USA) Strength of nanostructures

Z. Suo (USA) Nanoscale mechanics of biological materials

MS4. Microfluidics

P. Tabeling (France) – Chair; R. J. Adrian (USA), J. Santiago (USA) – Co-Chairs

Introductory Lectures:

D. S. Stewart (USA) Miniaturization of explosive technology and microdetonics

J. Santiago (USA) Electrokinetic flow instabilities in microfluidic systems

P. Tabeling (France) Slip, patterns, and other small things in microfluidic systems

MS5. Microgravity flow phenomena

J.C. Legros (Belgium) – Chair; P. Neitzel (USA), J. I. D. Alexander (USA) – Co-Chairs

Introductory Lectures:

- G. M. Homsy (USA) Microgravity and microscale fluid mechanics
 M. Louge (USA) Collisional granular flows with and without gas interactions in microgravity
 D. Weaire (Ireland) Foams, films and surfaces in microgravity

MS6. Atmosphere and ocean dynamics

J. Sommeria (France) – Chair; M.E. McIntyre (U.K.) – Co-Chair

Introductory Lectures:

- O. Bokhove (Netherlands) Wave-vortex interactions in the atmosphere and oceans, with applications to climate
 P. H. Haynes (UK) Transport and mixing in the atmosphere
 O. Talagrand (France) Assimilation of observations into numerical models

Pre-Nominated Sessions and Chairs

Fluid Mechanics:

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|-------|--|-------|--|
| FM1. | Biological fluid dynamics
M. Gharib (USA)
F. van de Vosse (Netherlands) | | A. Leder (Germany)
J. Westerweel (Netherlands) |
| FM2. | Boundary layers
P. W. Duck (UK)
A. Kluwick (Austria) | FM11. | Flow control
J. B. Freund (USA)
M. Gad-el-Hak (USA) |
| FM3. | Combustion and flames
N. Peters (Germany)
P. Wolanski (Poland) | FM12. | Flow in porous media
A. K. Mojtabi (France)
V. Nikolaevskiy (Russia) |
| FM4. | Complex and smart fluids
B. Khusid (USA)
A. L. Yarin (Israel) | FM13. | Flow instability and transition
P. Huerre (France)
P.A. Monkewitz
(Switzerland) |
| FM5. | Compressible flow
H. Hornung (USA) | FM14. | Flow in thin films
N. Aksel (Germany)
V. Shkadov (Russia) |
| FM6. | Computational fluid dynamics
(jointly with IACM)
L. Kleiser (Switzerland)
W. Schröder (Germany) | FM15. | Fluid mechanics of materials
processing
F. Dupret (Belgium)
R. Moreau (France) |
| FM7. | Convective phenomena
G. de Vahl Davis (Australia)
K. Zhang (UK) | FM16. | Fluid mechanics of
suspensions
R. Bonnecaze (USA)
E. Guazzelli (France) |
| FM8. | Drops and bubbles
J. Eggers (Germany & UK)
A. Prosperetti (USA) | FM17. | Granular flows
R. Behringer (USA)
I. Goldhirsch (Israel) |
| FM9. | Environmental fluid dynamics
H. E. Huppert (UK)
R Narasimha (India) | FM18. | Low-Reynolds-number flow
R. H. Davis (USA)
C. Pozrikidis (USA) |
| FM10. | Experimental methods in fluid
mechanics | | |

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| <p>FM19. Magneto hydrodynamics
P. A. Davidson (UK)
A. Thess (Germany)</p> <p>FM20. Multiphase flows
S. Balachandar (USA)
J. Magnaudet (France)</p> <p>FM21. Solidification and crystal growth
M. Glicksman (USA)
M. G. Worster (UK)</p> <p>FM22. Stirring and mixing
H. Aref (USA)
E. Villermaux (France)</p> | <p>FM23. Topological fluid mechanics
P. L. Boyland (USA)
K. Ohkitani (Japan)</p> <p>FM24. Turbulence
O. Metais (France)
R. D. Moser (USA)</p> <p>FM25. Vortex dynamics
G. J. F. van Heijst (Netherlands)
E. Krause (Germany)</p> <p>FM26. Waves
W. K. Melville (USA)
V. I. Shrira (UK)</p> |
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Solid Mechanics:

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| <p>SM1. Computational solid mechanics
(jointly with IACM)
T. Belytschko (USA)
P. Wriggers (Germany)</p> <p>SM2. Contact and friction mechanics
(jointly with IAVSD)
I. Goryacheva (Russia)
A.I. Klarbring (Sweden)
G. Szefer (Poland)</p> <p>SM3. Control of structures
F. Chernousko (Russia)
S. Pellegrino (UK)</p> <p>SM4. Damage mechanics
M. Chrzanowski (Poland)
P. Steinmann (Germany)</p> <p>SM5. Dynamic plasticity of structures
N. Jones (UK)
T. Wierzbicki (USA)</p> <p>SM6. Elasticity
R. Kienzler (Germany)
L. Wheeler (USA)</p> <p>SM7. Experimental methods in solid mechanics
I. Emri (Slovenia)
J. Freire (Brazil)</p> | <p>SM8. Fatigue
J. Dominguez (Spain)
K. Reifsnider (USA)</p> <p>SM9. Fracture and crack mechanics
(jointly with ICF)
D. Gross (Germany)
A. Needleman (USA)</p> <p>SM10. Functionally graded materials
R. Batra (USA)
G. H Paulino (USA)</p> <p>SM11. Impact and wave propagation
A Norris (USA)
K Wilmanski (Germany)</p> <p>SM12. Material instabilities
D. Bigoni (Italy)
H. Petryk (Poland)</p> <p>SM13. Mechanics of composites
S. Adali (South Africa)
N. A. Fleck (UK)</p> <p>SM14. Mechanics of phase transformations
(jointly with IACM)
F. D. Fischer (Austria)
A. Molinari (France)</p> <p>SM15. Mechanics of porous materials
W. Ehlers (Germany)
J. M. Huyghe (Netherlands)</p> |
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| SM16. | Mechatronics
W. O. Schiehlen (Germany)
M. Tomizuka (USA) | Zs. Gaspar (Hungary)
S. Kyriakides (USA) |
| SM17. | Multibody dynamics
M. Geradin (Belgium)
F. Pfeiffer (Germany) | SM23. Stochastic micromechanics
Y. Brechet (France)
Y. Shibutani (Japan) |
| SM18. | Plasticity and viscoplasticity
E. van der Giessen
(Netherlands)
P. Perzyna (Poland) | SM24. Structural optimization
(jointly with ISSMO)
K. K. Choi (USA)
J. Herskovits (Brazil) |
| SM19. | Plates and shells
(jointly with IACM)
H. Mang (Austria)
E. Ramm (Germany) | SM25. Structural vibrations
I. Blekhman (Russia)
K. Popp (Germany) |
| SM20. | Rock mechanics and
geomechanics
Z. Mroz (Poland)
I. Vardoulakis (Greece) | SM26. Vehicle dynamics
S. Iwnicki (UK)
R. Sharp (UK) |
| SM22. | Stability of structures | SM27. Viscoelasticity and creep
F. Cocks (UK)
N. Ohno (Japan) |

Topics involving both fluid mechanics and solid mechanics

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| FSM1. | Acoustics
T. Geers (USA)
N. Peake (UK) | M. P. Païdoussis (Canada) |
| FSM2. | Chaos in fluid and solid
mechanics
I. Mezic (USA)
G. Rega (Italy) | FSM5. Mechanics of foams and
cellular materials
S. Hilgenfeldt (Netherlands)
D. L. Weaire (Ireland) |
| FSM3 | Continuum mechanics
K. R. Rajagopal (USA)
G. Saccomandi (Italy) | FSM6. Multiscale phenomena in
mechanics
A. Carpinteri (Italy)
C. Miehe (Germany) |
| FSM4. | Fluid-structure interaction
J. Grue (Norway) | FSM7. Education in mechanics
R. Engel (USA)
B. Karihaloo (UK) |

All contributed papers were peer reviewed. Recommendations had been received from Pre-selection Committees of the National Committees of the nine countries: Canada, France, Germany, Japan, PR China, Poland, Russia, UK and USA. Moreover, recommendations had been received from the Chairs of the Mini-Symposia and of the Pre-nominated Sessions. Finally, the International Papers Committee paid careful attention to the above recommendations. Accordingly, of the 2086 eligible submissions 1574 contributions were invited by the IPC for their presentation. Finally 1235 contributed papers and 38 invited talks were given in Warsaw.

Fluid Mechanics was a subject of 550 presentations, Solid Mechanics was selected as a subject of 611 presentations, and 112 contributions aimed to cover problems involving both areas of mechanics and education in mechanics. The total number of participants, accepted papers and presentations represent a quite substantial enhancement relative to the previous congresses (Table 1), providing evidence of vitality of the contemporary mechanics. Table 2 displays country statistics of the presentations.

Table 1 ICTAM04 compared with four previous congresses

ICTAM	Submitted Papers	Presented Papers/ Presented from organizers country		Participants/ Participants from organizers country	
Grenoble 1988	1262	573	n.a.	951	340
Haifa 1992	1183	420	n.a.	525	85
Kyoto 1996	1642	703	192	936	332
Chicago 2000	1953	1126	445	1430	587
Warsaw 2004	2086	1273	144	1515	194

A book of abstracts with a CD-ROM including Extended Summaries of all accepted papers was distributed during the Congress. The Abstracts and Extended Summaries are available online on the Congress website <<http://ictam04.ippt.gov.pl>>. After congress proceedings "Mechanics of 21st Century" are published by Springer. They include full text of invited talks and attached CD-ROM with Extended Summaries of papers presented during the Congress by authors.

Table 2 ICTAM04 COUNTRY STATISTICS

Submitted and accepted contributed papers. Presented lecture, seminar and invited presentations.

	Country	Sub.	Acc.	Lec.	Sem.	Inv.
1	ALGERIA	5	2	0	1	0
2	ARMENIA	9	4	0	1	0
3	AUSTRALIA	12	9	4	3	0
4	AUSTRIA	17	16	10	5	0
5	BANGLADESH	1	0	0	0	0

6	BELARUS	17	8	1	3	0
7	BELGIUM	19	14	10	3	2
8	BOSNIA & HERTZ	1	0	0	0	0
9	BRAZIL	20	15	5	6	0
10	BRUNEI	1	0	0	0	0
11	BULGARIA	9	8	0	5	0
12	CAMEROON	1	1	0	0	0
13	CANADA	17	16	7	6	0
14	CHILE	2	1	0	1	0
15	CHINA	96	51	17	24	0
16	COLOMBIA	1	0	0	0	0
17	CROATIA	1	1	0	0	0
18	CUBA	1	1	0	0	0
19	CZECH REPUBLIC	19	15	2	12	0
20	DENMARK	21	20	15	5	1
21	EGYPT	5	0	0	0	0
22	ESTONIA	9	8	4	4	0
23	FINLAND	9	7	2	5	0
24	FRANCE	207	180	90	58	5
25	GEORGIA	5	1	0	0	0
26	GERMANY	124	109	63	34	3
27	GREECE	11	10	6	3	0
28	HUNGARY	12	11	6	4	0
29	INDIA	39	19	4	7	0
30	INDONESIA	1	0	0	0	0
31	IRAN	16	11	2	6	0
32	IRELAND	4	4	2	1	1
33	ISRAEL	37	34	13	13	1
34	ITALY	42	33	11	8	0
35	JAPAN	99	80	36	36	0
36	JORDAN	1	1	0	0	0
37	KAZAKHSTAN	11	5	0	2	0
38	KENYA	2	2	0	0	0
39	KYRGYZSTAN	3	0	0	0	0
40	LATVIA	6	5	1	4	0
41	LIBYA	4	3	1	0	0
42	LITHUANIA	4	3	1	2	0
43	MALAYSIA	1	0	0	0	0
44	MEXICO	7	6	1	4	0
45	MOLDOVA	1	1	0	0	0
46	NETHERLANDS	42	40	28	7	3
47	NEW ZEALAND	3	1	0	1	0
48	NIGERIA	3	2	0	1	0
49	NORWAY	7	7	2	4	0
50	PAKISTAN	1	0	0	0	0

51	POLAND	200	147	42	99	3
52	PORTUGAL	8	7	6	1	1
53	QATAR	1	1	0	1	0
54	ROMANIA	18	7	2	3	0
55	RUSSIA	235	132	31	43	1
56	S. KOREA	26	21	5	12	0
57	SAUDI ARABIA	1	1	0	1	0
58	SERBIA	4	2	0	2	0
59	SINGAPORE	8	4	2	1	0
60	SLOVAKIA	3	2	0	1	0
61	SLOVENIA	4	4	0	3	0
62	SOUTH AFRICA	6	4	2	2	0
63	SPAIN	19	17	7	7	0
64	SWEDEN	13	12	8	3	0
65	SWITZERLAND	11	10	7	2	0
66	TAIWAN	27	20	1	14	0
67	THAILAND	1	0	0	0	0
68	TURKEY	9	6	0	2	0
69	UK	118	110	60	36	2
70	UKRAINE	92	55	4	32	0
71	USA	282	243	120	50	15
72	UZBEKISTAN	11	1	0	0	0
73	VIETNAM	1	0	0	0	0
	TOTAL	2084	1571	641	594	38

Summary Record of the General Assembly Meeting 2004

Summary Record of the General Assembly of IUTAM in Warsaw, Poland, on 17 and 18 August 2004

The General Assembly of IUTAM convened in the Senate Room of the main building of the Warsaw University of Technology, Warsaw, Poland. The schedule of sessions was as follows:

Tuesday 17 August 2004

17.30 – 22.30 h: *General Assembly: 1st session*

Wednesday 18 August 2004

14.00 – 16.30 h: *General Assembly: 2nd session*

Attendance:

Members with voting rights:

S. Al-Athel (Saudi Arabia), H. Aref (USA), Y. Bai (China), A. Baltov (Bulgaria), D. Barthes-Biesel (France), T. Belytschko (USA), B. Boley (USA, Member-at-Large), A. Boström (Sweden), D. van Campen (Netherlands), P. Carpenter (UK), C. Cercignani (Italy), G. Chernyi (Russia), N.D. Cristescu (Romania), E. Cui (China), E. Dick (Belgium), J. Dual (Switzerland), J. Engelbrecht (Estonia), B. Freund (USA), U. Gabbert (Germany), I. Goldhirsch (Israel), N.K. Gupta (India), W. Gutkowski (Poland), J. Hansen (Canada), M.A. Hayes (Ireland, Member-at-Large), C. Herakovich (USA), M. Ismail (Egypt), S. Kaliszky (Hungary), T. Kambe (Japan), B.L. Karihaloo (UK), A. Kluwick (Austria), W. Knauss (USA), G. Leal (USA), F. Lund (Chile; 1st session only), B. Lundberg (Sweden), G. Maier (Italy), C. Miehe (Germany), G. Mikhailov (Russia), K. Moffatt (UK), P. Monkevitz (Switzerland; 2nd session only), M. Morozov (Russia), M. Määttänen (Finland), R. Narashima (India), F. Niordson (Denmark, Member-at-Large), P. O'Donoghue (Ireland), N. Olhoff (Denmark), S. Paavola (Finland), N. Peake (UK), T. Pedley (UK), P. Podio-Guidugli (Italy), M. Rubin (Israel), D. Ruzic (Yugoslavia), J. Salençon (France), S. Savage (Canada), W. Schiehlen (Germany), W. Schröder (Germany), A. van Steenhoven (Netherlands), B. Storåkers (Sweden), P. Suquet (France), G. Szefer (Poland), J. S. Sørensen (Denmark), V. Tamuzs (Latvia), A. Thess (Germany), T. Tatum (Japan, Member-at-Large), Ch. de K. du Toit (South Africa), D. Vandepitte (Belgium), E. Watanabe (Japan), D. Weaver (Canada), L. van Wijngaarden (Netherlands, Member-at-Large), W. Yang (China), T. Yu (China-Hong Kong), S. Zaleski (France), A. Zaoui (France), J. Zu (Canada).

Non-voting observers:

J. Achenbach (USA; chair Solid Mechanics Panel), E. de Arantes e Oliviera (Portugal; chair WP-5), S. Bodner (Israel; chair WP-3), S. Crandall (USA; repres. of ICA), M. Crocker (USA; repres. of IIAV), I. Gledhill (South Africa), P. Huerre (France; chair Fluid Mechanics Panel), R. Moreau (France; repres. of HYDROMAG), D. Parry (New

Zealand; Vice-President ICSU), G. Rozvany (Hungary; repres. of ISSMO), R. Sharp (UK, chair WP-2), B. Schrefler (Italy; repres. of CISM), K. Uetani (Japan).

Members with voting rights represented by proxies:

R. de Borst (Netherlands), represented by D.H. van Campen
 P. Germain (France, Member-at-Large), represented by J. Salençon
 Ph. Hodge (USA, Member-at-Large), represented by C. Herakovich
 J. Hult (Sweden, Member-at-Large), represented by A. Boström
 G. Jaiani (Georgia), represented by M. Hayes
 D. Weaver (Canada, represented by S. Savage
 Zh. Zheng (China), represented by E. Cui

Agenda Tuesday 17 August 2004, 18.30 – 22.30 h

1. Opening of the meeting by the President
 Minutes of the General Assembly, Cambridge (UK), 2002 (Report 2002, pp. 79-100)
2. Report by the Secretary-General
3. Report by the Treasurer on financial matters
4. Preliminary discussion on annual dues
5. Report by the Secretary of the Congress Committee
6. Matters concerning Adhering Organizations
 - 6.1 Restructured Adhering Organization from the Netherlands
 - 6.2 Suspension of membership of Morocco
7. Matters concerning Affiliated Organizations
 - 7.1 ICA (International Commission for Acoustics)
8. Reports and preliminary discussions on Working Parties
 - 8.1 Chair of the WP-8 on Geophysical and Environmental Mechanics
 - 8.2 General Policy for membership of Working Parties
 - 8.3 Reports on the WPs 1, 2, 3, 4, 5, 6, 7 and 9
9. Report on matters relating to ICSU
10. Matters concerning Inter-Union Committees
11. Matters concerning non-ICSU organizations
12. Preliminary discussion on changes of Statutes
13. Report of the Electoral Committee
14. Proposals for election of Members-at-Large
15. Report on closure of the Assessment Actions (postponed to 2nd session)
16. Publication of Proceedings (postponed to 2nd session)
17. Preliminary discussion on future IUTAM Symposia. Reports from Symposia Panels
18. Preliminary discussion on future International Summer Schools on Mechanics

Agenda Sunday 18 August 2002, 14.00 – 17.15 h

- 7.1. (cont.) ICA (International Commission for Acoustics)
15. (postponed) Report on closure of the Assessment Actions
16. (postponed) Publication of Proceedings
19. Continued discussion and final decision regarding future IUTAM Symposia

20. Continued discussion and final decision regarding future International Summer Schools on Mechanics
21. Continued discussion and final decision regarding annual dues
22. Continued discussion and final decision regarding Working Parties
23. Continued discussion and final decision regarding changes of Statutes
24. Election of members of the Bureau
25. Election of Members-at-Large
26. Election of members of the Congress Committee of IUTAM
27. Election of member of the Symposia Panels
28. Date and venue of the next General Assembly
29. Any other business

Proceedings of the General Assembly

Item 1 – Opening of the meeting by the President

The President, Professor H.K. Moffatt, opened the meeting and greeted all members and observers welcome. The minutes of the General Assembly held in Cambridge (UK) in 2002 were adopted.

Item 2 – Report by the Secretary General

The Secretary-General, Professor D.H. van Campen, submitted the following report to the General Assembly on the activities of IUTAM since the last General Assembly in Cambridge, USA, on 17 and 18 August 2002:

Mr. President, Dear Colleagues,

Two years have passed since our last General Assembly in Cambridge, UK. During that time I have had the sad duty of recording the deaths of four of our distinguished colleagues and friends who have served our Union. May I ask all of you to stand in honor of our deceased, while I read their names.

Professor Aleksandr Ishlinsky of Russia died on 7 February, 2003, aged 89. He was the Founder of the Institute for Problems in Mechanics of the Russian Academy of Sciences in 1964 and its first Director till 1990. He made important contributions to the dynamics of rigid bodies, the theory of gyroscopes, inertial navigation, the theory of friction, and plasticity. He was elected Vice-President of the Executive Committee of the World Federation of Engineering Organizations and an Honorary Member of numerous foreign academies and international institutions.

Professor Ishlinsky actively participated in IUTAM and was a Member-at-Large of the General Assembly.

Professor Friedrich Rimrott of Canada died on 25 June 2003. He was internationally recognized for his many scholarly contributions to a variety of fields including plasticity, thin shell theory, gyro dynamics and spacecraft design and analysis. He received numerous international awards as well as honorary doctorates.

Professor Rimrott was instrumental in obtaining membership for Canada in IUTAM and chaired the Canadian National Committee for IUTAM from 1963 to 1971. He was President of the 15th ICTAM, 1980, in Toronto and remained active for IUTAM after that. The mechanical engineering community has benefited enormously from his energy, enthusiasm and dedicated service.

Professor Giovanni Bianchi died on 13 November 2003. He carried out important research in propagation of shock waves in metals and in the theory of mechanisms. Professor Bianchi has been very actively involved in the International Centre for Mechanical Sciences, the first Institution to be affiliated to the IUTAM. He was Secretary-General of CISM from 1977 to 2001, then he became Director, and his affection to the task brought him to cooperate with the Centre until his last days of life. As CISM representative in the IUTAM, Professor Bianchi supervised all IUTAM-CISM Summer Schools. He will be missed by his friends and the scientific community for his humanity and long-sight.

Professor Y.H. Ku (read by Professor B. Boley).

Professor Y.H. Ku was born in China on Dec. 24, 1902, a date late enough in that year so that he had almost but not quite reached the age of 100 when he died in 2002. He came to the United States for his technical education, culminating with the award of the Doctor's degree in 1928 from MIT. He returned then to China, where he pursued a distinguished career in various universities, first as a professor, rising to the position of department head, dean of engineering in two different institutions, and then university president. At the same time he rose to high positions in the Chinese Ministry of Education, and thus merited nomination from the Bureau of Education in Shanghai, and subsequent election to the General Assembly of IUTAM in 1949. He came to the United States permanently the following year, as professor of electrical engineering at the University of Pennsylvania. He pursued his work in that field throughout his life, but as indicated by the title of his magnum opus, issued in 1958, "Analysis and Control of Non-Linear Systems", the applications of his research far exceeded electrical engineering, and were the basis for his importance in the field of mechanics. He consulted for several American industrial concerns and won numerous prizes and awards. I will not catalogue these in detail, but it is worth noting that many of them were not for technical achievements, but in celebration of some of his poems, plays, novels and essays he wrote in the Chinese language, as well as his historical works on Japanese Zen masters and development. It is clear that he was a person of wide intellectual interests and large technical impact. He faithfully attended our General Assembly, where he was a quiet participant, but one who was carefully listened to when he spoke. Those who knew him will certainly miss him. Our sympathy and grateful thoughts for what they did for our Union go to their families and their nations.

Adhering Organizations

There are now 50 Adhering Organizations. The restructuring of the Adhering Organization from the Netherlands and the suspension of the Adhering Organization from Morocco will be addressed later under item 6 on the Agenda.

In the past year there have been contacts with Singapore, which might result in the establishment of an Adhering Organization there.

Affiliated Organizations

The reports presented by the Affiliated Organizations in the past two years are included in the IUTAM Reports 2002 and 2003. The application of ICA for membership within ICSU will be addressed later under item 7.1 on the Agenda. Some additional matters concerning the Affiliated organizations are mentioned below.

CISM (International Centre for Mechanical Sciences):

In April last year the Vice-President has visited CISM and discussed the state of affairs with respect to the IUTAM Archive. For the time being, CISM keeps the IUTAM Archive as agreed. As of January 2004, Professor J. Salençon is one of the rectors of CISM.

EUROMECH (European Mechanics Society):

After having consulted with EUROMECH, the Bureau appointed Professor T. Pedley, UK, as the representative of IUTAM in EUROMECH. He succeeds Professor W. Schiehlen in this capacity.

Working Parties

Taking account of the discussions during the General Assembly in Cambridge (UK), the Bureau has updated the Report on Working Parties and Standing Scientific Committees. The updated Report, dated 24 March 2004, was enclosed in the material sent earlier to the General Assembly.

In the meantime, the WPs 1-7 and 9 have started their activities. The reports provided by these WPs were also enclosed in the material distributed earlier to the General Assembly and they will be discussed later under item 8 of the agenda.

With respect to the WP-8 on Geophysical and Environmental Mechanics, the chair envisaged at the previous General Assembly appeared to be unable to accept. The Bureau has prepared a proposal, which will be presented later under item 8 on the agenda.

Matters concerning ICSU

To be reported by the President under item 9.

Inter-Union Committees

Scientific Committee on Problems in the Environment (SCOPE). Professor J. Hunt, University College London, UK, has accepted to become the new representative of IUTAM on SCOPE.

Symposia and Summer Schools

There were ten IUTAM Symposia in 2002, with average attendance 70. Additionally, there was one Summer School in 2002, in Beijing, China, with 60 participants. In 2003 there were 4 IUTAM Symposia, with average attendance 61. That year, there was one Summer School, in CISM, Udine, with 37 participants.

Two Symposia from the 2002/2003 package have been withdrawn due to inability of the respective Chairs to organize their Symposium.

For 2004 nine IUTAM Symposia are being organized, whereas seven Symposia are scheduled for 2003.

Sponsorship

The Bureau agreed to co-sponsor with a grant of US\$ 1,000.- the International Conference on Physics and Control in St. Petersburg, Russia, 20-22 August 2003.

IUTAM has been represented on the scientific committee of this event by Professor J. Engelbrecht. Here, for the first time the new procedure for co-sponsoring by IUTAM of non-IUTAM events as set by the Bureau has been applied.

Furthermore, was agreed to accept the Biot Centennial Conference in Norman, Oklahoma, USA, from 24-27 May 2005, for co-sponsorship (no financial consequences involved) and to appoint Professor J. Salençon as the IUTAM representative on the Scientific Committee.

Closure of Assessment Actions

The Bureau has decided to prepare a report on the closure of the Assessment Actions. This report has been enclosed in the material distributed earlier to the GA and it will be discussed later under item 15 of the agenda.

IUTAM website

The new IUTAM website is now running smoothly and it is of great help to the IUTAM secretariat. The major website developments over the past two years have been described in the IUTAM Newsletters and they include the following.

As of 1 April 2003 the domain name iutam.org has moved to the IUTAM Secretariat. IUTAM is greatly indebted to Professor H. Aref, Professor J. Phillips and their staff from UIUC for their support and help in enabling this transition.

In the section on Organization of the IUTAM website a new page has been opened on Working Parties, where also the 2003 reports of the Working Parties have been made accessible. Furthermore, a new page on Members-at-Large has been opened.

A new integrated Calendar of Upcoming Events has been opened of IUTAM and organizations linked to IUTAM. These latter organizations are currently the Affiliated Organizations of IUTAM. In each of the Affiliated Organizations a contact person has been authorized to keep the information on the events of that organization up to date. In this way the calendars of CISM and EUROMECH are combined with the IUTAM calendar.

In the history section of the website, the ICTAM-2000 poster has been included, as well as the photo of the 1938 ICTAM. I am very grateful to Professors H. Aref and J. Phillips for enabling this.

IUTAM Newsletter

The IUTAM Newsletter has been revived in 2002 and it is appearing twice a year since then.

Publications

As far as I can see, publication of Symposia Proceedings by Kluwer is running smoothly. The future of the publication of Symposia Proceedings will be addressed later under item 16 of the agenda.

D.H. van Campen, Secretary-General

The report by the Secretary-General was adopted. The President thanked the Secretary-General for his report.

Item 3 – Report by the Treasurer on financial matters

The Treasurer, Professor L.B. Freund, submitted the following report to the General Assembly.

Mr. President and colleagues in the General Assembly,

With reference to the *IUTAM Report 2003*, the Union's assets as of 31 December 2003 stood at \$388,985. This reflects a modest budget surplus of \$5,386 for the year. Because a portion of the Union's cash reserves is held in euros, there was also an apparent gain from the decrease in value of the dollar compared to the euro over the course of the year.

The main source of revenue for the Union is subscription dues. Adhering organizations which are represented in the General Assembly continue to pay dues on a more or less regular schedule. More than 88% of these organizations are fully paid through 2003, and 60% have paid dues for 2004. Regrettably, there are currently a very small number adhering organizations for which dues are seriously in arrears.

The cash reserves of the Union earned interest in the amount of \$3673 during the year. This interest income is derived from savings accounts held in banks in the Netherlands and in the United States.

In closing its accounts for ICTAM2000, the organizers returned a surplus of \$10,000 to IUTAM for the specific purpose of supporting its initiative in international capacity building. This was matched by a \$10,000 allocation from our own operating funds, and it represented a substantial matching fund commitment to the AIMS proposal that was eventually funded by ICSU.

The level of support of symposia and summer schools sponsored by IUTAM has been \$5000 per such event since the beginning of 1998. During 2003, awards were provided to four symposia and one summer school course. The Union also

cosponsored the Physics and Control 2003 conference, held in St. Petersburg, during the year.

The cost of travel for members of the Bureau and for members of the Executive Committee of the Congress Committee totaled approximately \$20,000 for the year.

The cost of administration is principally the cost of operating the office of Secretary General. The amount committed for this purpose in 2003 was unusually large for a combination of reasons. Because of the way in which dates of expenditures are recorded in our accounting system, this figure represents expenditures for 18 months rather than one year. In addition, during the course of the year, the value of the dollar, the currency in which expenses are paid, diminished almost 40% compared to the euro, the currency in which expenses are incurred. In 2000, the Bureau committed a certain level of support to maintain the IUTAM web site, an effort that has been found to be well worth the resources committed.

The financial records of IUTAM are subject to an audit by an independent international accounting firm each year. This firm must submit a formal report and certification to ICSU by March 15th of each year. In recent years, this audit has been conducted by the firm UWP UNITREU GMBH in Eschborn, Germany.

The amount shown as bank fees represents per transaction costs charged by commercial banks for receiving dues payments, arranging symposium awards, and conducting other business.

In summary, the financial state of the Union has remained stable for some years. It is likely that this stable situation can be sustained for the foreseeable future. If additional commitments are to be considered by IUTAM, it will be necessary to identify additional sources of revenue to support them.

In closing, it is a pleasure to acknowledge the help and advice provided by assistant treasurers Professor Bruno Boley and Professor Dick van Campen.

Respectfully submitted, L. B. Freund, Treasurer

The report by the Treasurer was adopted. The President thanked the Treasurer for his most successful work.

Item 4 – Preliminary discussion on annual dues

Following his report the Treasurer led a brief discussion on the annual dues. He surveyed the annual dues and the course of the OECD-index over the past two years. During that period the rate of consumer price index change showed an average increase of 2.3% per year. The Treasurer proposed to increase the dues for 2006 with 2.0% to \$ 676 and those for 2007 with a further 2.1% to \$ 696.

It was noted that the final decision regarding annual dues would be made in the second session of the General Assembly, see item 18 below.

Item 5 – Report by the Secretary of the Congress Committee

The Secretary of the Congress Committee, Professor T.J. Pedley, submitted the following report:

Mr. President and Colleagues,

In July last year, the Executive Committee of the Congress Committee (XCCC) met in Tallinn, Estonia. That meeting was entirely concerned with the preparations for the present ICTAM.

The full Congress Committee (CC) met two days ago (15 August) and the following items were on the agenda:

1. First, the preparations for the 21st ICTAM by the Local Organizing Committee (LOC), led by the Congress President, Professor Witold Gutkowski, and its Secretary-General, Professor Tomasz Kowalewski, have been going very well. The Congress is going very smoothly and our Polish hosts are to be congratulated with having put everything together so well.
2. The paper selection procedure for the ICTAM. The Pre-nominated Sessions (PNS) were introduced in Kyoto in 1996. There is no doubt that the existence of PNS has resulted in a stronger participation at the ICTAMs. The system of PNS is relatively new and the CC is keeping it under review. There is an ongoing debate about the duties of the IPC, which makes the final paper selection for the Congress. In particular, this debate refers to how much weight the IPC should attach to the advice received from the PNS chairs and by the national committees of the 9 countries that have them. It is intended that the matter will be subject to extensive discussion at the CC meeting in two years time, probably resulting in some changes.
3. Selection of the site of ICTAM-2008, to be made during the second session of the CC on Thursday afternoon and to be announced at the banquet on Thursday evening. There are three strong bids from the cities of Adelaide (Australia), Beijing (China) and New Delhi (India).
4. Finally, the CC has drawn up a shortlist of candidates for election by the GA to serve on the CC in place of those who have come to the end of their terms. Altogether, the CC has 35 members. A number of these are retiring, having served two four-year terms. If people have served just one four-year term on the CC, they should be re-elected automatically for a second term. As a result, there appears to be 13 vacancies left, one of these resulting from the passing away of Professor Ku, who had a life-time appointment. There are 12 CC members who have served more than one term and who would normally retire from the CC. These are Professors H. Aref, D. Bogy, J. Engelbrecht, L.B. Freund, G. Gladwell, P. Lugner, H.K. Moffatt, R. Moreau, N. Olhoff, T.J. Pedley, P. Suquet and F.-G. Zhuang. Of these twelve, there are three people who should be re-elected in view of special circumstances, namely, Professors T.J. Pedley, L.B. Freund and H. Aref. For the 10 resulting vacancies a large number of proposals have been received. One of these refers to Professor Kowalewski, who

according to the CC, should be elected automatically in view of his experience as Secretary-General of the present Congress. For 7 of the nine remaining slots the CC proposes 2 candidates and, in view of the strong proposals received, 3 candidates are proposed for the 2 remaining slots. In the second session on Wednesday, the members of the GA have to vote for 7 of the 16 short listed candidates.

Finally, I am sure we would like to record our gratitude to the retiring CC members for their cooperation in the work of the CC over at least 8 years. This holds in particular for those members who have served on the XCCC, namely Professors H.K. Moffatt, R. Moreau and N. Olhoff.

T.J. Pedley, Secretary Congress Committee

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

Item 6 – Matters concerning Adhering Organizations

6.1. Restructured Adhering Organization from The Netherlands

As of May 2004, the Netherlands Mechanics Committee (NMC) acts as the Dutch Adhering Organization to IUTAM, thereby replacing the Department of Mechanics of the Royal Dutch Institute of Engineers in this capacity. The latter organization is now one of the Constituent Organizations of the NMC.

6.2. Suspension of membership of Morocco

The Adhering Organization from Morocco is seriously in arrears in maintaining subscriptions within IUTAM. In fact the Adhering Organization from Morocco never paid IUTAM dues since its admission in 1998.

The Treasurer and the Secretary-General have sent several letters, but no response was received.

In view of this the Bureau regretfully is forced to recommend to the General Assembly that the membership of the Adhering Organization from Morocco be suspended.

It was agreed that the membership of the Adhering Organization from Morocco be suspended.

Item 7 – Matters concerning Affiliated Organizations

ICA (International Commission for Acoustics)

The Board of ICA is preparing an application for membership within ICSU and has requested to discuss their application during the General Assembly in Warsaw.

The President introduced the case and pointed out that ICA is now comparable in size to IUTAM and meets the criteria for admission in ICSU.

However, it may be emotionally difficult for IUTAM to approve the ICA application, because then IUTAM will lose one of its Affiliated Organizations. Additionally,

IUTAM has to take into account the opinion of its other Affiliated Organization in the area of acoustics, namely IIAV (the International Institute of Acoustics and Vibration).

Furthermore, terminating the affiliation of ICA with IUTAM results in an increase of the fragmentation of mechanics, something which Working Party 1 has expressed as a matter of concern. Finally, ICA could reach all its desired goals in ICSU by remaining affiliated

to IUTAM. The only advantage for ICA of ICSU membership could be an increased prestige as an independent union. On the other hand, ICSU membership would result in increased costs involved for ICA.

Professor S. Crandall, the representative of ICA in IUTAM, commented that ICA only partly overlaps with IUTAM: whereas on the one hand the mechanics part of acoustics is only a small sub-field within IUTAM, acoustics covers a much broader field than mechanics alone. There is not much overlap in the agendas of ICA and IUTAM and this becomes evident from the low number of acoustics people present in the General Assembly of IUTAM.

Professor M. Crocker, the representative of IIAV in IUTAM, remarked that IIAV does not see the benefits of independent membership within ICSU.

It was agreed to have a straw vote on this matter at the beginning of the second session.

Item 8 – Reports and preliminary discussion on Working Parties

8.1. Chair of the WP-8 on Geophysical and Environmental Mechanics

The Bureau proposed to the General Assembly to appoint Professor P. Linden of the University of California at San Diego, USA, as chairman of the WP-8 on Geophysical and Environmental Mechanics.

It was noted that the final decision regarding this proposal would be made in the second session of the General Assembly, see item 22 below.

8.2. General Policy for membership of Working Parties

The President expressed that in order to keep the Working Parties alive, flexibility with respect to their membership is considered to be a prerequisite. In order to achieve this goal, the President proposed, on behalf of the Bureau, to the General Assembly as follows:

- a) In principle, the chairs of the Working Parties should be appointed for a four-year period with an exceptional extension of two years. Preferably, the chairmanship should rotate within the existing membership of a WP.
- b) In principle, the duration of membership of a WP (ordinary members of a WP are appointed by the Bureau) should not exceed eight years.
- c) In principle, the maximum number of members of a WP should be set to five. If the General Assembly agrees with this, then most of the currently active WPs would be entitled to increase their membership by one.

It was noted that the final decision regarding this proposal would be made in the second session of the General Assembly, see item 22 below.

8.3 Reports on the WPs 1, 2, 3, 4, 5, 6, 7 and 9

In addition to the written reports, the chairpersons of the Working Parties presented further developments and views from the Working Parties. Some remarks, made during the presentations and the subsequent discussions, will be surveyed below.

WP-1 on Non-Newtonian Fluid Mechanics and Rheology

Professor G. Leal, replacing the chair of WP-1, Professor A. Pearson, noticed that currently the ICR and IUTAM world congresses are organized in the same year and on different dates, but in different parts of the world. It would be useful if future ICR and IUTAM world congresses could be held in the same part of the world.

Professor L. van Wijngaarden, having noticed the comment of the chair of WP-1 on fragmentation of mechanics in his written report, expressed that he feels it to be an advantage that the IUTAM mechanics is penetrating in other fields

WP-2 on Dynamical Systems and Mechatronics

Professor R. Sharp, the chair of WP-2, surveyed the terms of reference as viewed by the members of WP-2. This appears to roughly coincide with the views as given in the report on WPs by the Bureau. Furthermore, Professor Sharp spoke in favor of rolling membership of the WPs.

WP-3 on Mechanics of Materials

Professor S. Bodner, the chair of WP-3, felt that at this stage no additions were needed to the report of the WP-3.

Professor J. Salençon had concluded from the report of WP-3 that this WP covers only fracture, but Professor Bodner expressed that this is not the case.

WP-4 on Materials Processing

Professor R. Moreau, the chair of WP-4, expressed that time has come for him to retire from this WP after 8 years of service as chair of this WP and its predecessor, the latter being limited to electromagnetic processing of materials. He proposed as his successor Professor R. McMeeking, who is already a member of this WP.

It was noted that the final decision regarding this proposal would be made in the second session of the General Assembly, see item 22 below.

Furthermore, Professor Moreau suggested some possibilities for renewal of the membership of this WP.

WP-5 on Computational Fluid and Solid Mechanics

Professor E. de Arantes e Oliviera, the chair of WP-5, reported that this WP had grown from the previous Working Party on the same topic, but that it is now recognized as the official link between IUTAM and IACM. The WP-5 is pleased that one of its members, Professor T. Belytschko, is also a member of the Congress Committee.

In 2003, the WP-5 met during the US National Computational Mechanics Congress in Albuquerque, New Mexico. Potential contributions to future Mini-Symposia were discussed. It was felt that the severe system of IUTAM in approving scientific meetings might hinder the launching of future IUTAM-IACM initiatives. The WP-5 suggests to consider the sponsoring without financial support of meetings proposed by the WP-5 and approved, exclusively, by the IUTAM Bureau and the IACM Executive Council.

In September this year, the WP-5 will meet again during the IACM Congress in Beijing. Furthermore, Professor Oliviera remarked that the WP-5 had not directly generated proposals for Symposia and Summer Schools for the 2006/7 cycle, nor were such

proposals directly sent to the WP-5 for advice. He was afraid that this situation might repeat itself in the future.

Finally, Professor Oliviera recommended to further increase interaction between IUTAM and IACM by stimulating that the representative (adhering) organizations for IUTAM and IACM in the different countries be the same.

WP-6 on Biomechanics

Professor D. Barthès-Biesel, the chair of WP-5, presented the major future directions in the area of this WP. In the coming year, WP-6 will certainly come up with suggestions for Mini-Symposia at the ICTAM-2008.

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

Professor W. Yang, the chair of WP-8, reported that progress in the area of this WP is going on very well. This year there will be an IUTAM Symposium (04-6) in the area of this WP and a desire exists to organize a future Summer School. In the coming year, this WP will certainly come up with suggestions for Mini-Symposia and Prenominated Sessions at the ICTAM-2008.

This WP proposes to add one more member in the fluids area, which fits within the framework of the Bureau proposal under item 8.2 of the agenda.

WP-9 on Education in Mechanics and Capacity Building

Professor B. Karihaloo, the chair of WP-9, reported that WP-9 wants to collect information on the shape (health) of mechanics in indifferent countries.

The President remarked that WP-9 may be instrumental in tightening the relations of IUTAM with ICSU. The topic of WP-9 falls within an important priority areas of ICSU, whereas last year ICSU approved an application of IUTAM on capacity building within the new ICSU grants programme (to be discussed further under item 9 on the agenda. Furthermore, the President pointed out that the Bureau had started a discussion on the possibility of new category of associate membership for countries unable to finance IUTAM dues. A possible associate membership should not involve payment of dues and it should probably be limited to a certain trial period. Also, an associate membership should probably be limited to countries sending at least one person to the ICTAM. Then, such membership could enable a non-voting delegate to attend the GA meetings. The Bureau would like to invite the WP-9 to prepare a report views and an advice concerning the option of an associate membership.

Several members present expressed support for the idea of an associate membership, among them Professor T. Pedley, Professor R. Narasimha, and Dr. I. Gledhill, the latter explicitly expressing her willingness to help in this.

Item 9 – Report on matters relating to ICSU

The President of IUTAM, Professor H.K. Moffatt, in his duty as IUTAM representative in ICSU, reported as follows.

Dear Colleagues,

First, may I extend a personal welcome to David Parry, Vice President of ICSU and Chair of ICSU's Committee on Scientific Planning and Review. David's presence here is a most welcome sign of the interest that ICSU is taking in the activities of its Scientific Unions, an interest that has not always been so evident in the past.

Since our last General Assembly in Cambridge two years ago, I have on your behalf attended two important ICSU meetings. The first was ICSU's own General Assembly held in Rio de Janeiro in September 2002; the second was the 'Unions Meeting' held in Paris, 9-10 February 2004.

There are currently 27 Scientific Union Members of ICSU, some of our closest sister Unions being the International Mathematical Union (IMU), the International Union of Geodesy and Geophysics (IUGG), the International Union of Pure and Applied Physics (IUPP), the International Union of Pure and Applied Chemistry (IUPAC), and the International Astronomical Union (IAU).

At its 2002 General Assembly, ICSU agreed its three current priority areas:

- Environment and its relations to sustainable development;
- Data and Information; and
- Capacity building/Education in Science.

It is noteworthy that IUTAM has itself given priority to two of these three areas, through the formation of its Working Parties WP-8 (Geophysical and Environmental Mechanics) and WP-9 (Education in Mechanics and Capacity Building).

ICSU Grants Programme

The former system of annual grants (usually \$10k per annum) from ICSU to IUTAM in support of selected Symposia was abolished in 2001/2. This system was replaced by the new 'project-oriented' grants programme, operated annually. For the 2004 grants (i.e. grants which are paid and must be spent during 2004), applications were invited in October 2002 with a submission deadline 1 March 2003. Following e-mail consultation with the General Assembly, the Bureau of IUTAM agreed to submit a proposal to support a capacity-building initiative "AIMS: African Institute for Mathematical Sciences". For full information about this initiative, see the website www.aimsforafrica.org. IUTAM was the 'lead applicant', and the proposal was supported by IMU, IUGG, IUPAP, IUPAC, IAU, by five national members of ICSU (South Africa, UK, Netherlands, Brazil, Egypt) and by the Third World Academy of Sciences (TWAS).

We received news in July 2003 that this grant application was successful, and that a maximal grant of \$100k had been awarded. At the same time, IUTAM itself committed an additional \$20k from its own resources to the AIMS project (\$10k of

this having been generously provided by Professor Aref from the surplus remaining from the Chicago ICTAM). The purposes of the ICSU grant were as follows:

- \$25k to support a Workshop on Capacity-Building in the Mathematical Sciences (this was held at AIMS, Muizenberg, South Africa) 14-17 April 2004;
- \$25k to support the activities of AIMSSec (the Schools Enrichment Centre attached to AIMS) (a workshop for South African school teachers of mathematics, funded by this contribution, was held at AIMS in July 2004);
- \$50k for the provision of facilities for the graduate students attending the first and second AIMS diploma courses held in 2003/4 and 2004/5.

The \$20k provided by IUTAM was used to provide additional support for the April 2004 workshop, which attracted participants from a wide range of African States, and which was attended also by contributing lecturers from the ICSU organisations that had supported the proposal. IUTAM was itself strongly represented by Professors Aref, van Campen and Salencon, as well as myself. One of the exciting projects discussed was a proposal (AMINET) to establish a network of Centres of Excellence across Africa, with AIMS as the hub.

There are clear advantages for IUTAM in being involved in the AIMS project: we are involved in a 'flagship' enterprise in capacity-building based in the African continent; we have generated awareness and have attracted the collaborative support of five sister Union members of ICSU; and we can ensure that theoretical and applied mechanics figures prominently (as it should) in the diploma teaching at AIMS (here it is noteworthy, for example, that Grae Worster has already given a first course in fluid dynamics at AIMS).

Regional Offices of ICSU

At its 2002 General Assembly, ICSU agreed to dissolve its Committee on Science and Technology in Developing Countries (COSTED), and to replace this by four Regional Committees representing Africa, Latin America and the Caribbean, Asia, and the 'Arab world'. The first of these will be located in South Africa, the second in Mexico; the locations of the third and fourth are still to be decided. Through AIMS, we have an involvement in Africa, while through CACOFD, we have an involvement in the Caribbean; (discussions are underway concerning the possible expansion of CACOFD to cover the whole of Latin America, and solid as well as fluid mechanics).

We have also many links with Asian science, not least through AFMC. The Bureau should consider in due course the possible appointment of an IUTAM representative for each region to act as liaison with the new ICSU regional offices.

Science in the XX1st century: challenges for UNESCO and ICSU

At the Unions meeting in Paris (February 2002), Walter Erdelen (representing UNESCO) addressed the subject "Science in the XX1st century: challenges for UNESCO and ICSU". He said that whereas the greatest scientific achievement of the XXth century might be seen to be the understanding of matter at the atomic level (a debatable point of view!), the problems of the XX1st century were more concerned with complex systems, collective phenomena, materials by design, multi-component devices and machines, nonlinearity, emergence, self-organisation, multiplicity of scale, irreducible uncertainty,... No problem in agreeing with him here! I believe that IUTAM would claim an involvement in all of these areas.

Energy for Sustainable Societies

At the same meeting, Laurie Geller (ICSU Science Officer for Scientific Planning and Review) spoke on "Science and Technology for Sustainable Development and Energy for Sustainable Societies". She talked of the 'three pillars': environmental protection, economic development, and social health; and of the great need for scientific education and capacity building. The discussion that followed ranged widely, from nuclear power for developing countries to the need to improve cooking technology (e.g. replacement of firewood stoves by solar cookers in the developing world); in all areas relating to energy production, conversion, storage, etc., IUTAM of course has an interest and relevant expertise.

H.K. Moffatt, Representative of IUTAM in ICSU

Professor M.A. Hayes congratulated the President and the other Bureau members involved with the AIMS initiative and thanked Professor Aref for his support. The Vice-President of ICSU, Professor D. Parry, complimented IUTAM with the AIMS initiative.

Item 10 – Inter-Union Committees and Commissions

Nothing to report.

Item 11 – Matters concerning non-ICSU organizations

Nothing to report

Item 12 – Preliminary discussion on changes of the Statutes

In the material sent to the General Assembly prior to the present meeting, the Bureau has proposed to the General Assembly changes in the Articles II and VI of the Statutes. The motivations for the proposed changes are as follows:

12.1 *Change of Article II*

Over the past decades there has been a clear increase of the visibility of the area of Computational Mechanics within Theoretical and Applied Mechanics as a whole. In view of this, it is proposed to recast Article II.a of the Statutes to account for this.

12.2. *Change of Article VI*

By tradition, IUTAM has different categories of invitees to the General Assembly without voting rights. During the development of the IUTAM website, the Statutes appeared not to be sufficiently specific on this item.

Hence, it is proposed to adopt Article VI as indicated in the distributed text.

Professor L. van Wijngaarden pointed out that the proposed change of Article VI would limit somewhat the options of suggestions for candidates for the Bureau to the Electoral Committee. It was agreed that Professor van Wijngaarden and the Secretary-General should further discuss this matter in the period between the two GA sessions and try to find a solution.

It was noted that the continued discussion and final decision regarding this proposal would be made in the second session of the General Assembly, see item 23 below.

Item 13 – Report of the Electoral Committee

The President, who according to the Statutes acted as chairman of the Electoral Committee, reported on the work of the Committee, consisting apart from himself of the GA members Professors Y. Bai (China), B. Boley (USA), S. Kaliszky (Hungary) and L. van Wijngaarden (Netherlands).

In October 2003 the Electoral Committee invited the members of the General Assembly to submit suggestions for candidates for the Bureau election by 31 January 2004.

The call for suggestions appeared to be successful and after careful evaluation of the suggestions the electoral Committee met on Saturday, 27 March 2004, in Cambridge, UK.

After careful consideration, the Electoral Committee prepared a shortlist of nominees for the positions of three officers and four members.

On request of the Electoral Committee three candidates indicated their willingness to accept an election for the three positions of officers, whereas eight candidates indicated their willingness to accept an election for the four positions of members.

On 23 April 2004 the final nominations were presented to the Secretary-General, who conveyed these nominations to the members of the General Assembly well in time.

These nominations, given below, were made taking account of spreading over the globe, of fields of endeavor, and of continuity and renewal.

Officer positions:

President: Professor L.B. Freund (USA)

Secretary-General: Professor D.H. van Campen (Netherlands)

Treasurer: Professor J. Engelbrecht (Estonia)

Non-Officer positions (one for each slot to be chosen by the General Assembly):

W: Professor N. Olhoff (Denmark) and Professor J. Salençon (France)

X: Professor T. Kambe (Japan) and Professor R. Narasimha (India)

Y: Professor W. Gutkowski (Poland) and Professor Z. Zheng (China)

Z: Professor A. Kluwick (Austria) and Professor C. Miehe (Germany)

After distribution of the nominations to the General Assembly Prof. Narasimha has indicated that on second thoughts he wished to resign from the list of nominees. The

Electoral Committee took notice of this and decided not to add an additional nominee for the position X.

After having concluded his report, the President pointed out that the nominations for each of the positions will be put to a vote in the second session of the General Assembly under item 24. Furthermore, the members of the Electoral Committee would be pleased to answer any questions.

Professor Mikhailov remarked that he was afraid that the nominee from China for the position Y would not be selected and, therefore, he proposed to shift the nominee from China from position Y to position X. This proposal was seconded by Professor Chernyi and, hence, it was agreed that it should be subjected to a vote in the second session under item 24.

Item 14 – Proposals for election of Members-at-Large

The Secretary-General reported that after the 2000 elections there were 12 Members-at-Large. Since then, 3 M-a-Ls passed away (Professors Drucker, Ishlinsky, Ku), so 9 M-a-Ls are remaining. Currently, there are 107 members of the General Assembly with voting rights. Hence, according to article 3 of the Procedure for electing Members-at-Large of the GA, the total number of M-a-Ls should not exceed about 1/8 of 107, which is 13. The Bureau had considered the nominations proposed by the General Assembly and taken the above considerations into account. The Bureau recommended to the General Assembly the reelection of Professors B. Boley, W. Fiszdon, J. Hult, F. Niordson (each of them was elected without time constraint about giving notice in advance of the GA meeting), P. Germain, M. Hayes, P. Hodge, T. Tatsumi, L. van Wijngaarden, and the election of Professors A. Acrivos (USA), S. Bodner, W. Schiehlen (Germany), F. Ziegler (Austria).

It was noted that the final decision regarding this proposal would be made in the second session of the General Assembly, see item 25 below.

Item 15 – Report on closure of the Assessment Actions

It was agreed to postpone this item to the second session

Item 16 – Publication of Proceedings

It was agreed to postpone this item to the second session

Item 17 – Preliminary discussion on future IUTAM Symposia

The Secretary-General had received 26 proposals for IUTAM Symposia in 2006/2007, listed below.

- F.1 *Interactions for Dispersed Systems in Newtonian and Viscoelastic Fluids* (Santa Barbara, CA, USA)
- F.2 *Recent Advances in Multiphase Flows: Numerical and Experimental* (Istanbul, Turkey)
- F.3 *Computational Physics and New Perspectives in Turbulence* (Nagoya, Japan)

- F.4 *Advances in Micro- and Nanofluidics* (Dresden, Germany)
- F.5 *Hamilton Dynamics, Vortex Structures, Turbulence* (Moscow, Russia)
- F.6 *Unsteady Separated Flows and their Control* (Corfu, Greece)
- F/S.1 *Swelling and Shrinking of Porous Materials: From Colloid Science to Poro-Mechanics* (Petrópolis-RJ, Brazil)
- F/S.2 *Non-Deterministic Methods in Computational Mechanics* (Leuven, Belgium)
- F/S.3 *Fluid-Structure Interaction in Ocean Engineering* (Hamburg-Harburg, Germany)
- S.1 *Centennial for Cosserat Theories and Their Applications* (Haifa, Israel)
- S.2 *Relation of Shell, Plate, Beam and 3D Models* (Tbilisi, Georgia)
- S.3 *Dynamic Behavior of Advanced Materials* (Carbondale, IL, USA)
- S.4 *Dynamics of Non-Equilibrium State in Micro/Nano Scale* (Hammond, LA, USA)
- S.5 *Mechanical Properties of Cellular Materials* (Cachan, France)
- S.6 *Multi-scale Plasticity of Crystalline Materials* (Eindhoven, Netherlands)
- S.7 *Concurrent Atomistic-Continuum Deformation and Fracture of Solids* (Aalborg, Denmark)
- S.8 *Scaling in Solid Mechanics* (Cardiff, UK)
- S.9 *Passive Noise Control by Numerical Optimization* (Dresden, Germany)
- S.10 *Plasticity at the Micron Scale* (Lyngby, Denmark)
- S.11 *Computational Contact Mechanics* (Hannover, Germany)
- S.12 *Emerging Trends in Rotordynamics* (New Delhi, India)
- S.13 *Dynamics and Control of Nonlinear Systems with Uncertainty* (Nanjing, China)
- S.14 *Discretization Methods for Evolving Discontinuities* (Lyon, France)
- S.15 *Size Effect and Non-linear Fracture in Quasibrittle Materials* (Bangalore, India)
- S.16 *Dissipative Processes in Materials and Structures* (Cardiff, UK)
- S.17 *Trends and Development of Nonlinear Dynamics in Mechanics* (College Park, MD, USA)

These proposals had been reviewed by the two Symposia Panels. All proposals and the preliminary reports of the Panels had been sent to the members of the General Assembly. During a joint meeting of the Symposium Panels in Warsaw, Poland, on 15 August 2004, the proposals had been grouped into three categories according to the system used since 1978.

The Chairmen of the Symposia Panels, Professors P. Huerre and J.D. Achenbach, reported on the recommendations of the two Panels.

On suggestion by the Treasurer it was agreed that the target for the number of proposals for Symposia to be accepted for the years 2006 and 2007 should be set to 15. This number could be increased by one if a good proposal, which at first instance would be rejected, would receive almost the same number of votes as a proposal which has been accepted.

After preliminary discussion the proposals coded F.1, F.2, F.3, F.6, F/S.3, S.5, S.6, S.10, S.13, S.14 were ranked “alpha”, those coded F.4, F.5, F/S.1, F/S.2, S.1, S.2, S.3, S.4, S.7, S.8, S.9, S.11, S.12, S.15, S.16, S.17 were ranked “beta”, whilst no proposals were ranked “gamma”.

It was agreed that the proposals ranked “alpha” would be accepted in the second session, whereas those ranked “beta” would be further considered at the second session.

Item 18 – Preliminary discussion on future IUTAM Summer Schools on Mechanics

The Secretary-General had received the following two proposals for IUTAM Summer Schools:

SS.1 *Modelling and Experimentation in Two-Phase Flow* (CISM, Udine, Italy, 2006)

SS.2 *Biomechanical Modelling at the Molecular, Cellular and Tissue Levels* (CISM, Udine, Italy, 2006)

The proposal coded SS.1 had been reviewed by the Symposia Panel for Fluid Mechanics. Very recently, it had turned out that this proposed Summer School is already scheduled as a CISM course for 2004. Hence, it was decided that this proposal should be removed from the list to be discussed by the General Assembly.

The proposal coded SS.2 had been reviewed by the Symposia Panel for Solid Mechanics and it was ranked “alpha”.

It was agreed that proposal coded SS.2 should remain ranked “alpha” and, hence, it would be accepted in the second session.

The President thanked the two Panels and their Chairmen on behalf of the General Assembly for their careful scrutiny of the proposals for IUTAM Symposia and IUTAM Summer Schools.

It was agreed that the final decision on future IUTAM Symposia and Summer Schools would be made in the second session under items 19 and 20, respectively. The meeting then adjourned.

The meeting reconvened on 18 August 2002 with a straw vote on item 7.

Item 7.1 (cont.) – ICA (International Commission for Acoustics)

Prior to the start of the straw vote, the President explained that a “no” means that at this stage the General Assembly does not wish to support the application of ICA for membership within ICSU. As a result of the straw vote the General Assembly appeared to be equally divided as regards the pros and cons of support to the application of ICA to membership within ICSU.

It was agreed that the Secretary-General should communicate this result to the President of ICA.

Item 15 (postponed) – Report on closure of the Assessment Actions

The Bureau had prepared a Report on the closure of the Assessment Actions, which was enclosed in the material distributed earlier to the General Assembly.

The Secretary-General introduced the Report and remarked that the major Assessment Actions refer to the establishment of the Working Parties and the development of a new website. The President recalled that the assessment had been initiated by Professor W. Schiehlen and he invited Professor Schiehlen to give his opinion about the result of the

assessment. Professor Schiehlen felt that the assessment process constituted a good step forward in the activities of IUTAM. The Working Parties have started in a new way and the new website has been positively received. Hence, the outcome of the assessment is positive and IUTAM should be grateful to the Assessment Panel for this.

It was agreed that the Secretary-General should write a letter to the Assessment Panel, indicating that the assessment actions are closed, and thanking the Panel, and in particular its Chairman and Secretary, for their very valuable work.

Item 16 (postponed) – Publication of Proceedings

The current Agreement with Kluwer Academic Publishers runs till the end of the year 2004. In view of commitments with respect to accepted IUTAM Symposia, an extension has been agreed with Kluwer till the end of 2005.

In view of the negotiations about a new contract and the changing needs, the Bureau has decided that a number of Publishers should be approached with some specific questions enclosed in the material sent earlier to the General Assembly. Originally, the Bureau intended to approach Kluwer, Springer and World Scientific with these questions, but due to the merger between Kluwer and Springer, which took place in 2003, Springer withdrew from responding to these questions.

The President gave a comparative survey of the responses obtained from Kluwer and World Scientific. It appeared that Kluwer has now substantially lowered the after-sales prices and that the offers by Kluwer and World Scientific can be considered to be comparable. It is remarkable that for both Publishers the price for electronic publishing is of the same order of magnitude as the price for hard covers.

The Vice-President, Professor Schiehlen, surveyed the historical development of publication of the Proceedings: first, up to 1990, Springer published most of the Proceedings. Then, they started to be choosy, and IUTAM switched to Kluwer in 1994. The major critical issue with Kluwer has always been the high after-sales prices and this is now resolved.

Several Members of the General Assembly expressed a positive opinion on the quality of the present publications by Kluwer.

The President remarked that the Bureau has to take the final decision on this item, but that the General Assembly can give some guidance.

It was concluded that there is some degree of support for continuing to publish the Proceedings with Kluwer for another three-year period under the new conditions. The Bureau should take a final decision on this and Kluwer and World Scientific should be informed about the result.

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

The General Assembly decided to accept the 10 symposia proposals, rated “alpha”, and coded F.1, F.2, F.3, F.6, F/S.3, S.5, S.6, S.10, S.13, S.14.

After further discussion of the remaining 16 proposals, rated “beta”, a vote was taken. *The following further 6 proposals were finally accepted:*

- F.4 *Advances in Micro- and Nano-fluidics*
F.5 *Hamilton Dynamics, Vortex Structures*
F/S.1 *Swelling and Shrinking of Porous Materials*
S.2 *Relation of Shell, Plate, Beam and 3D Models*
S.8 *Scaling in Solid Mechanics*
S.11 *Computational Contact Mechanics*

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

The General Assembly decided to accept the Summer School coded SS.2 and rated “alpha”.

Item 21 – Continued discussion and final decision regarding annual dues

Following the proposal made by the Treasurer, Professor L.B. Freund, see item 4, *the General Assembly decided the following amounts for the units of dues:*

US \$ 676 in 2006

US \$ 696 in 2007

Item 22 – Continued discussion and final decision regarding Working Parties

It was agreed to appoint Professor P. Linden as chairman of the WP-8 on Geophysical and Environmental Mechanics (cf. item 8.1).

With respect to the general policy for the membership of Working Parties, the President remarked that the chairs of the WPs should be enabled to indicate the end of life time of their WP. A reasonable lifetime for a Working Party was considered to be 12 years, at least in principle.

It was agreed to accept the general policy for the membership of Working Parties as specified under item 8.2.

It was agreed to support the appointment of Professor R. McMeeking as the new chair of the WP-4 on Materials Processing (cf. item 8.3). He should be invited by the Secretary-General.

Item 23 – Continued discussion and final decision regarding changes of Statutes

In between the two sessions of the General Assembly Professors van Wijngaarden and van Campen had discussed the matter of a possible limitation of options for candidates for the Bureau due to the proposed change of Article VI of the Statutes. Based on their discussion, they proposed to adapt Article 3 of the Procedure for election of the Bureau of IUTAM to account for this effect. This adaptation was accepted by the General Assembly.

The General Assembly unanimously approved the changes of the Articles II and VI of the Statutes as proposed under item 12. The General Assembly also unanimously approved the change of the Article 3 of the Procedure for election of the Bureau according to the proposal by Professors van Wijngaarden and van Campen.

These changes should be included in the IUTAM Report 2004 and they read as follows:

Change of Article II.a (additions/changes underlined);

II* The principal objectives of the Union are:

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;

* Article II adopted by the General Assembly on August 18, 2004, in Warsaw, Poland

Change of Article VI (additions/changes underlined);

VI** The General Assembly is composed of the following voting members:

- a) representatives of the adhering organizations (Article VIII);
- b) members of the Bureau (Article XI);
- 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 X);
- ii) Secretary of the Congress Committee (Article XII);
- iii) chairmen of the Symposia Panels;
- iv) chairmen of the Working Parties;
- v) representatives of countries applying for membership;
- vi) representatives of committees and groups of scientists, if so decided by the General Assembly.

** Article VI adopted by the General Assembly on August 18, 2004, in Warsaw, Poland

Change of Article 2 of Procedure for election of the Bureau of IUTAM (additions / changes underlined):

Procedure for election of the Bureau of IUTAM*****

- 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,

***** Procedure adopted by the General Assembly on August 18, 2004, in Warsaw, Poland

Item 24 – Election of members of the Bureau

The General Assembly decided by raising hands not to accept the proposal of Professor Mikhailov mentioned under item 13.

The General Assembly elected unanimously by raising hands the following persons to the three vacant Officer positions P, S and T and to the vacant non-Officer position X for the period 2004-2008:

President: Professor L.B. Freund (USA)

Secretary-General: Professor D.H. van Campen (Netherlands)

Treasurer: Professor J. Engelbrecht (Estonia)

(according to Article XI of the Statutes, the retiring President, Professor H.K. Moffatt, will serve as Vice-President)

Position X: Professor T. Kambe (Japan)

The General Assembly elected by secret ballot the following persons to the three vacant non-Officer positions W, Y, and Z for the period 2004-2008:

Position W: Professor N. Olhoff (Denmark)

Position Y: Professor Z. Zheng (China)

Position Z: Professor A. Kluwick (Austria)

Item 25 – Election of Members-at-Large

The General Assembly reelected Professors B. Boley, W. Fiszdon, J. Hult, F. Niordson, P. Germain, M. Hayes, P. Hodge, T. Tatsumi and L. van Wijngaarden as Members-at-Large for the period 2004-2008.

The General Assembly elected Professors A. Acrivos (USA), S. Bodner, W. Schiehlen (Germany) and F. Ziegler (Austria) as members-at-Large for the period 2004-2008.

Item 26 – Election of members of the Congress Committee of IUTAM

The General Assembly decided to reelect the following persons as members of the Congress Committee for the period 2004 through 2008:

Prof. H. Aref, USA, member of the XCCC

Prof. L.B. Freund, USA

Prof. T.J. Pedley, UK, Secretary of the Congress Committee

Prof. M. Bendsøe (Denmark, representing ISSMO)

Prof. D.H. van Campen (Netherlands)

Prof. D. Durban (Israel)

Prof. P. Gudmundson (Sweden)

Prof. T. Kambe (Japan)

Prof. B. Karihaloo (UK, representing ICF)

Prof. L.G. Leal (USA, representing ICR)

Prof. F. Lund (Chile)

Prof. P.A. Monkewitz (Switzerland)

The General Assembly decided to elect the following persons as members of the Congress Committee for the period 2004 through 2008:

Prof. N. Aubry, USA

Prof. D. Barthès-Biesel, France

Prof. A. Carpinteri, Italy

Prof. G. Cheng, China

Prof. I. Goryacheva, Russia

Prof. T. Kowalewski, Poland

Prof. S. Kyriakides, USA

Prof. P. Ladevèze, France

Prof. A. Thess, Germany

Prof. V. Tvergaard, Denmark

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

Prof. H. (Hassan) Aref, USA, 2008, member of XCCC

Prof. N. (Nadine) Aubry, USA, 2008

Prof. D. (Dominique) Barthès-Biesel, France, 2008

Prof. T. (Ted) Belytschko, USA, 2006, representative of IACM

Prof. M.P. (Martin) Bendsøe, Denmark, 2008, member of XCCC, representative of ISSMO

Prof. D.E. (Dimitri) Beskos, Greece, 2006

Prof. D.H. (Dick) van Campen, Netherlands, 2008

Prof. A. (Alberto) Carpinteri, Italy, 2008

Prof. G.-D. (Gengdong) Cheng, China, 2008

Prof. D. (David) Durban, Israel, 2008

Prof. F. Ellyin, Canada, 2006, representative of ICM

Prof. N.A. (Norman) Fleck, UK, 2006

Prof. L.B. (Ben) Freund, USA, 2008, President, member of the XCCC

Prof. I. (Irina) Goryacheva, Russia, 2008

Prof. P. (Peter) Gudmundson, Sweden, 2008

Prof. M.A. (Michael) Hayes, Ireland, 2006, representative of ISIMM

Prof. T. (Tsutomu) Kambe, Japan, 2008

Prof. B.L. (Bhushan) Karahaloo, UK, 2008, representative of ICF

Prof. A. (Alfred) Kluwick, Austria, 2006

Prof. T.A. (Tomasz) Kowalewski, Poland, 2008, member of the XCCC

Prof. V.V. (Valery) Kozlov, Russia, 2006

Prof. E. (Edwin) Kreuzer, Germany, 2006

Prof. S. (Stelios) Kyriakides, USA, 2008

Prof. P. (Pierre) Ladevèze, France, 2008

Prof. L.G. (Gary) Leal, USA, 2008, representative of ICR

Prof. F. (Fernando) Lund, Chile, 2008
Prof. P.A. (Peter) Monkewitz, Switzerland, 2008
Prof. T.J. (Timothy) Pedley, UK, 2008, Secretary, member of XCCC
Prof. B.A. (Bernhard) Schrefler, Italy, 2006, member of XCCC
Prof. K. (Kazimierz) Sobczyk, Poland, 2006
Prof. A. (André) Thess, Germany, 2008
Prof. E.O. (Ernie) Tuck, Australia, 2006
Prof. V. (Viggo) Tvergaard, Denmark, 2008
Prof. M.G. (Manuel) Velarde, Spain, 2006, representative of CISM
Prof. E. (Eiichi) Watanabe, Japan, 2006

Item 27 – Election of member of Symposia Panels

All members of the Symposia Panels have served for one four-year term. Also, the Panel chairs have acted in this capacity for one four-year term (Professor P. Huerre has been an ordinary member of the Fluids Panel since 1996, whereas Professor J. Achenbach has been an ordinary member of the Solids Panel since 1992).

The Bureau recommended to the General Assembly to let the membership of the Symposia Panels unchanged for the coming four years.

This proposal was adopted by the General Assembly.

Item 28 – Date and venue of the next General Assembly

On invitation by Professor L.B. Freund the General Assembly will hold its next meeting in Rhode Island, USA, on a date during the summer period of the year 2006 yet to be fixed.

Item 29 – Any other business

- Professor L. van Wijngaarden, the representative of IUTAM in CISM, reported that the current Resident Rector of CISM, Professor M. Velarde, will resign as of January 2005, and that Professor G. Maier will become the new Resident Rector.
- Professor L. van Wijngaarden asked how the Working Parties will be involved in generating proposals for Mini-Symposia and Prenominated Sessions. The Secretary of the Congress Committee responded that the chairs of the WPs will receive a reminder in due course next year.
- Professor R. Moreau remarked that there should be bridges between the mechanics community and other communities. The Working Parties are ideally suited to form such bridges. However, most Working Parties currently constitute only one direction on the bridge, namely the one starting from IUTAM. The only formal example of a bridge working in two directions seems to be the IUTAM-IACM Working Party on Computational Fluid and Solid Mechanics. This example should probably followed by other Working Parties. Professor D. Barthès-Biesel responded that in the case of the Working Party on Biomechanics an informal bridge is already present.

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- The President, Professor H.K. Moffatt, thanked the leaving Bureau members Professors W. Schiehlen, C. Cercignani, R. Nararimha and J. Salençon for their service to the IUTAM Bureau. Professor Schiehlen had served on the Bureau in different capacities for many years, whereas the other retiring members had served on the Bureau for four years.

Then, the President closed the meeting.

Dick van Campen, Secretary-General

2004 Treasurer's Report

	USD
Balance, 31 December 2003	388,984.73
Net revenues minus expenses for 2004	19,680.93
Balance, 31 December 2004	408,665.66
Revenues collected during 2004:	
Subscription dues	88,074.20
Interest income	5,761.05
ICSU allocations (AIMS grants)	99,972.00
Symposia grant repayment	1,787.14
ICTAM 2004 payment	29,837.50
Repayment of ICTAM planning grant	15,000.00
Total	240,431.89
Expenses paid during 2004:	
Symposia	45,000.00
IUTAM Summer School	5,000.00
Travel, Bureau	10,883.72
Travel, Congress Committee Executive Committee	2,118.10
Travel, Other	19,522.53
Contribution to ICSU	2,704.00
AIMS grant	110,319.00
Administration & printing	32,046.21
Auditor's fee	2,670.64
Bank fees	1,379.27
Bureau prizes	1,500.00
Total	233,143.47
Revenues minus expenses for 2004	7,288.42
Gain (loss) from exchange of currency	12,392.51
Net revenues minus expenses for 2004	19,680.93

Statement of IUTAM Bank Accounts
(1 January 2003 through 31 December 2003)

Bank	Balance 31-Dec-03	Withdrawals 2004	Deposits 2004	Balance 31-Dec-04	Currency
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Checking Accounts

Citizens Bank Providence 1009-367-2	36,291.84	(219,723.20)	226,268.66	42,837.30	USD
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Citizens Bank Providence 1597-967-1	125,527.62	0.00	2,433.59	127,961.21	USD
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ABN-AMRO Bank Eindhoven 41.41.42.551	36,757.65	(13,198.90)	8,451.20	32,009.95	USD
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ABN-AMRO Bank Eindhoven 41.41.28.311	666.44	(162.31)	0.84	504.97	EUR
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Savings Accounts

Citizens Bank Providence	103,363.13	0.00	1,379.56	104,742.69	USD
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ABN-AMRO Bank Eindhoven	72,625.02	0.00	1,391.40	74,016.42	EUR
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IUTAM Bank Account Information

Treasurer:

Professor J. Engelbrecht, Institute of Cybernetics at Tallinn University of Technology, Akadeemia 21, 12618 Tallinn, Estonia

Assistant Treasurers:

Professor D. H. van Campen, Faculty of Mechanical Engineering, Eindhoven University of Technology, Postbus 315, NL-5600 MB Eindhoven, The Netherlands
 Professor L. B. Freund, Division of Engineering, Brown University, Providence, RI 02912-9104, USA

Bank Accounts:

ABN-AMRO Bank, Postbus 515, 5600 AM Eindhoven, The Netherlands, Account 41.41.28.311 (EUR), 41.41.42.551 (USD)
 Citizens Bank, One Citizens Drive, Riverside, RI 02915-3000, Account 1009-367-2 (USD)

Subscription Due Paid in Membership Units (1 January 2004 through 31 December 2004)

Adhering Organization	1999	2000	2001	2002	2003	2004
Argentina	1	1	1	--	--	--
Australia	3	3	3	3	3	3
Austria	1	1	1	1	1	1
Belgium	5	5	5	5	5	--
Brazil	1	1	1	1	1	1
Bulgaria	1	1	--	1	--	1
Canada	8	8	8	8	8	8
Chile*	1	1	1	1	1	--
China/Beijing China/	8	8	8	8	8	--
Hong Kong	1	1	1	1	1	--

Adhering Organization	1999	2000	2001	2002	2003	2004
China/Taipei	3	3	3	3	3	3
Croatia	1	1	1	1	1	1
Czech Republic	1	1	1	1	1	1
Denmark	3	3	3	3	3	3
Egypt	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 **			--	--	--	--
Germany	8	8	8	8	8	8
Greece	1	1	1	1	1	1
Hungary	1	1	1	1	1	--
India***	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	1	1	1	--
Latvia	1	1	1	1	--	1
Morocco						

Adhering Organization	1999	2000	2001	2002	2003	2004
Netherlands	5	5	5	5	5	--
New Zealand	1	1	1	1	1	1
Norway	1	1	1	--	--	--
Poland	3	3	3	3	3	3
Portugal	1	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	1
Serbia and Montenegro	1	1	1	1	1	--
Slovakia	1	1	1	1	1	1
Slovenia	1	1	1	1	1	1
South Africa	1	1	1	1	1	1
Spain	1	1	1	1	1	1
Sweden	5	5	5	5	5	5
Switzerland	3	3	3	3	--	--
Turkey	1	1	1	1	1	1
Ukraine			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 2004 and a blank space indicates no adhering organization. Dues are expressed in membership units of 1, 3, 5, 8 or 12, corresponding to category of membership from I through V, respectively.

- * Chile, unpaid 1997, 1998
- ** Georgia has partly paid (~0.5 units)
- *** India, paid by check 2004 but not recorded in Bank Statement for 2004

Reports on Affiliated Organizations

AFMC (Asian Fluid Mechanics Committee)

No report has been submitted by AFMC.

CACOFD (Caribbean Congress on Fluid Dynamics)

The Caribbean Congress of Fluid Dynamics is an international non-governmental non-profit scientific organization. The objective of CACOFD is to engage in all activities intended to promote Fluid Dynamics in the Caribbean.

CACOFD Conferences

CACOFD hosted the Sixth Caribbean Conference on Fluid Dynamics at The University of the West Indies, Trinidad, on 22-23 January, 2004 and was organized jointly by the Department of Mathematics and Computer Science and the Faculty of Engineering. The principal objective of the conference was to identify and confer existing research efforts in both theoretical and experimental Fluid Dynamics in the region, and to provide a forum for professionals from the international scientific community to discuss problems of mutual interest.

The conference brought together a relatively small but powerful group of participants in the field of Fluid Dynamics. There were five invited speakers of international repute: Prof. Keith Moffat (FRS) from Cambridge University, Prof. Howard Stone from Harvard University, Prof. Hendrik Kuhlmann from Vienna University of Technology, Prof. I. A. Eltayeb from Sultan Qaboos University and Prof. F. Busse from the University of Bayreuth. There were forty participants, some of whom were from Venezuela, Austria, India, Moscow, Finland, The United States of America, and the United Kingdom. Areas of Fluid Dynamics receiving special attention included: Flow through Porous Media, Computational Fluid Mechanics, Non-Newtonian Fluid Mechanics, Bio-Fluid Mechanics, Thermal Instability and Heat Transfer, Water Resources, Coastal Processes,

Viscous Compressible Fluids, Viscous Incompressible Fluids and Magnet Hydrodynamics (MHD). The conference proceedings are available on CD-ROM.

The new Executive of CACOFD was elected during the conference. The members of this Executive are Prof. F. Malpica, President, Dr. D. Comissiong, Secretary, Dr. K. Rahaman, Treasurer, and Dr. L. Rojas, Public Relations Officer. Prof. H. Ramkissoon is the Honorary President of CACOFD.

CACOFD will be hosting the Seventh Caribbean Conference on Fluid Dynamics in 2007.

Report composed by Harold Ramkissoon

CISM (International Centre for Mechanical Sciences)

1. Courses and Seminars

The regular programme of courses and seminars, planned for the Centre for 2004 by the Scientific Council, took place in two Scientific Sessions, the Bjerknæs Session (June-July 2004) and the D'Alembert Session (September-October 2004). The topics, always at an advanced level, included different fields of mechanics and related sciences, both at a basic and applied level. Several courses were sponsored by UNESCO.

The Bjerknæs Session

- Multiscale Modelling of Damage and Fracture Processes in Composite Materials
- Nonlinear Dynamical Systems in Economics
- Control of Solids and Structures: Mathematical Modelling and Engineering Applications
- Microsystems Mechanical Design
- Environmental Stratified Flows
- Applied Micromechanics of Porous Materials

The D'Alembert Session

- Surface Waves in Geomechanics: Direct and Inverse Modelling for Soils and Rocks
- Modelling and Experimentation of Two-Phase Flow
- Nonlinear Waves in Fluids: Recent Advances and Modern Applications
- Nonlinear Dynamics and Chaos for High Volume and Ultra Precision Metal Cutting
- Nonsmooth Mechanics of Solids

2. Other Events

Besides the above courses, the following other meetings were organized or hosted by CISM in 2004

- CEPET 4th Workshop (Central European Programme. in Economic Theory) (June 2004)
- Security Assessment, Control and Management of Dams (December 14-17. 2004)

3. Editorial Activities

The lectures of several courses held at CISM are published in book form and distributed by Springer Verlag Vienna-New York.

The following books were published in 2004:

- H. Irschik-K. Schlacher, *Advanced Dynamics and Control of Structures and Machines*
- G. Del Piero-D.R. Owen, *Multiscale Modelling in Continuum Mechanics and Structured Deformations*
- T. Kowalewski-D. Gobin, *Phase Change with Convection: Modelling and Validation*
- G. Saccomandi-R.W. Ogden, *Mechanics and Thermomechanics of Rubberlike Solids*
- F.D. Fischer, *Moving Interfaces in Crystalline Solids*
- F. Darve-I. Vardoulakis, *Degradations and Instabilities in Geomaterials*
- B. Loret -J. Huyghe, *Chemo-mechanical Couplings in Porous Media Geomechanics and Biomechanics*
- V. Starov-I. Ivanov, *Fluid Mechanics of Surfactant and Polymer Solutions*
- H.J. Boehm, *IUTAM Summer School Mechanics of Microstructured Materials*
- F. Pfeiffer-T. Zielinska, *Walking - Biological and Technological Aspects*
- P.B. Pascolo, *Biomechanics and Sports*

The international Journal for rapid communication “Mechanics Research Communications” (bimonthly) created by CISM and Pergamon Press, Oxford-New York in 1973, published in 2004 its thirtyfirst volume. It contains short communications on research related to a wide domain of both theoretical and applied mechanics.

4. Scholarships

A number of scholarships, including free lodging and board or exemption from registration fee, was offered during the courses to participants who were not supported by their home institutions, priority being given to young researchers coming from countries that contribute to CISM’s operating resources.

Partial travel reimbursements as well as free board and lodging in Udine were granted to several participants from Mediterranean and Central European countries, thanks to a UNESCO contribution.

5. International Participation

In 2004 67 lecturers from 18 countries delivered lectures in the Bjerknes and D’Alembert Sessions. The courses were attended by 367 participants coming from 37 countries.

Report composed by Bernard Schrefler

EUROMECH (European Mechanics Society)

No report has been submitted by EUROMECH.

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 field, 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.maschinenbau.tu-ilmeneau.de/mb/wwwtd/hydromag/home.html>

This WWW-site contains information on membership, forthcoming conferences, the electronic HYDROMAG newsletter and a link to the German Ferrofluid Information Server, maintained by Dr. S. Odenbach (University of Bremen).

During the year 2004 several workshops and scientific meetings have been conducted involving the active participation of HYDROMAG and its members including International Conference on Magnetic Fluids 2004, Guaruja, Brazil which was considered as a major highlight.

A group of European Scientists successfully established a network on MHD in frame of the COST-programme of the European Commission called "COST action P6 Magnetofluidynamics". The programme supports mutual visits of scientists. Detailed information can be obtained from

http://www.maschinenbau.tu-ilmeneau.de/mb/wwwtd/COST/COST_Page01.html

Report composed by André Thess

IABEM (International Association for Boundary Element Methods)

No report has been submitted by IABEM.

IACM (International Association for Computational Mechanics)

The WCCM VI - 6th International Association for Computational Mechanics (IACM) World Congress took place in Beijing, China on September 5 - 10, 2004

Next IACM World Congress WCCM VIII - 7th International Association for Computational Mechanics (IACM) World Congress, Century City, California, USA on July 16 - 22, 2006

The following IACM supported events took place in 2004:

III International Congress on Numerical Methods in Engineering and Applied Sciences Monterrey, Mexico, January 22-24, 2004

VI International Congress on Numerical Methods in Engineering, Lisbon, Portugal, May 31 – June 2, 2004.

ICCMS 2004, First International Congress on Computational Mechanics and Simulation Kanpur, India. 9-12 December, 2004.

Future IACM supported events:

IASS IACM'05 5th International Conference on Computation of Shell & Spatial Structures, Salzburg, Austria, June 1-4, 2005.

VII World Congress on Computational Mechanics, Century City, California, USA, 16-22 July, 2006. USNCCM VIII

8th U.S. National Congress on Computational Mechanics, Austin, Texas, 24-28 July, 2005.

COMPLAS VIII International Conference on Computational Plasticity, Barcelona, Spain, September, 5 -8, 2005.

VII World Congress on Computational Mechanics, Century City, California, USA., 16-22 July, 2006.

For further details on the above events you can contact the IACM Secretariat, iacm@cimne.upc.es .

Further information on IACM activities can be found in the web page www.iacm.info
Report prepared by Sergio Idelsohn Secretary General of IACM

Report composed by Sergio Idelsohn**IAVSD (International Association for Vehicle Systems Dynamics)**

The main event organized by IAVSD was the 3rd International Tyre Colloquium TMVDA 04 Tyre Models For Vehicle Dynamics Analysis in the time August 29-31, 2004 at Vienna, University of Technology, Austria (<http://tmvda.tuwien.ac.at/>). The event was successful and attended by many scientists and experts from industry from many countries. There were presented 44 papers in 2 parallel sessions. During the event it was organized and evaluated the Tyre Model Performance Test (TMPT).

In the year 2004 IAVSD has again co-operated on the organization of the International AVEC'04 Symposium on Advanced Vehicle Control in the time August 23-27, 2004 in Arnhem, HAN University, the Netherlands (<http://www.avec04.han.nl/>). The event was successful and attended by many scientists from many countries. There were presented 141 papers in 5 parallel sessions.

The supplements of Vehicle System Dynamics Journal from selected papers from 5th World Congress on Computational Mechanics in Vienna 2002 and with the Proceedings of International 18th IAVSD Symposium 2003 in Kanagawa, Japan were published.

The next associated events of IAVSD will be the International 19th IAVSD Symposium 2005 in Milano, Italy from August 29 to September 2, 2005.

Report composed by Michael Valasek

ICA (International Commission for Acoustics)

(<http://www.icacommission.org>)

The International Commission for Acoustics (ICA) is a worldwide consortium of societies concerned with the field of acoustics. The ICA convenes the triennial International Congress on Acoustics in accordance with the Commission's guidelines. The ICA has also undertaken a number of initiatives to promote international development and collaboration in all fields of acoustics. The ICA currently has 45 Member Societies worldwide.

The 18th triennial Congress was held on 4-9 April 2004 in Kyoto, Japan. 1332 participants and 91 accompanying persons joined from 47 countries and 965 papers were presented including four plenary, 14 keynote and two closing lectures.

The ICA held its annual Board meeting in Kyoto, Japan on 3 and 9 April 2004. The General Assembly was held on 7 April 2004 in Kyoto and Professor Philip A. Nelson was elected President, Professor Sonoko Kuwano Secretary General, Professor Hugo Fastl Treasurer and the other board members were also elected for the year 2004-2007.

ICA has established a new award called *ICA Early Career Award* for an individual who is relatively early in his/her professional career, and who has been active in the field of Acoustics. This award was given to the two scientists just after the opening ceremony of the 18th ICA in Kyoto. Also Young Scientists Conference Attendance Grants were given to 16 young researchers to support their travel to Kyoto.

The ICA continues to promote its *Conference Grant Program* for small (< 100 attendance) specialty symposia on acoustics. Support is now provided for a number of symposia each year. Each symposium typically receives up to US\$ 2000. The following

four symposia were approved for support in 2004 to provide travel assistance for international participation:

- Subjective and Objective Assessment of Sound, 2004 (Poznan, Poland)
- 9th Meeting of the European Society of Sonochemistry, 2004 (Badajoz, Spain)
- 9th School on Acousto-optics and applications, 2004 (Gdansk, Poland)
- 7th International Symposium on Transport Noise and Vibration, 2004 (St. Petersburg, Russia)

This program is funded jointly between the ICA and the Committee for International Research and Education of the Acoustical Society of America.

The ICA continues to maintain an *International Calendar* of Meetings and Congresses on Acoustics through the ICA Information Services. The Calendar is published simultaneously on the ICA web site and in the Journal of the Acoustical Society of America.

At the general assembly in Kyoto, ICA made the decision to apply for membership of ICSU and the application was submitted to ICSU in March 2005.

The 19th Congress will be held on 2-7 September 2007 in Madrid, Spain and the 20th Congress in 2010 in Sydney, Australia.

Report composed by Philip A. Nelson and Sonoko Kuwano

ICF (International Congress on Fracture)

2004 was a busy year for ICF in preparation for ICF11 in Turin (March 2005). Apart from the organisers of ICF11 headed by Professor Alberto Carpinteri, the various committees of ICF, elected at ICF10 in 2001, were actively completing their tasks. Among these committees were the Nominations Committee, chaired by Professor Rob Ritchie, charged with preparing a list of nominations for the membership of ICF Executive Board, and the Awards Committee, co-chaired by Professors Bhushan Karihaloo and Alberto Carpinteri, charged with canvassing the ICF community for nominations for the award of ICF Honorary Fellowships. Both these committees will report to the Executive Board and the Council of ICF during ICF11.

Early indications suggest that ICF11 is going to be a very successful event with more than 1000 participants, thanks to the efforts of ICF11 organisers.

This is my last report to IUTAM as the representative of ICF. The decision on my successor will be taken at ICF11 and communicated to IUTAM by the new President of ICF in 2005.

Report composed by Bhushan L Karihaloo in consultation with Yiu-Wing Mai (President of ICF).

ICHMT (International Centre for Heat and Mass Transfer)

No report has been submitted by ICHMT.

ICM (International Congress on the Mechanical Behaviour of Materials)

The forth coming ICM Conference will be held in Busan, Korea, Korea, May 6-10, 2007, chaired by Professor S.W. Nam of the Korea Advanced Institute of Science and Technology.

The ICM Congress is now seeking proposals for the 2011 Conference. The interested organizations in hosting the Conference are requested to contact the President or the Secretary of the Congress.

The Board of Governors in its meeting of May 27, 2003 in Geneva Switzerland approved a motion to review and revise the ICM Charter in view of the changes in the field since it was first drafted in August of 1971. A draft revised Charter was produced in 2004 and is being reviewed.

Report composed by Fernand Ellyin, President of ICM

ICR (International Committee on Rheology)

The major organizational activity in 2004 was the XIVth International Congress on Rheology, held in the COEX Convention Center in Seoul, Korea, August 11 to 16. The Korean Society of Rheology, under the leadership of Professor Jae Chun Hyun of Korea University and Professor Seung Jong Lee of Seoul National University, organized the conference. Over 600 rheologists from 31 countries attended and participated in a program which included four plenary lectures, 23 keynote presentations, 329 contributed talks and 211 poster presentations. The strong technical program was complemented by enjoyable cultural events and legendary Korean hospitality. In his State of Rheology address at the Opening Ceremony, the ICR Secretary noted that, while activity and challenges in rheology are as strong as ever, memberships in national societies have not been increasing recently, in contrast to steady increases in the past decade and a half.

The International Committee on Rheology met during the Congress. The twenty-two Delegates from member countries confirmed the proposed site of the next Congress, namely Monterey, California. The host organization for the Congress is the Society of Rheology (USA) and the co-Chairs are Professor Gerry Fuller of Stanford University and

Professor Bob Powell of UC Davis. The Delegates also discussed relations with IUTAM and elected the two officers of the ICR. Prof. Jae Hyun was elected Chairman of the Committee, succeeding Prof. K. Walters (who co-chaired the 2000 Congress), and Prof. Manfred Wagner of Berlin Technical University was elected Secretary, succeeding Professor David James of the University of Toronto, who had served for 16 years.

Report composed by David F. James

ICTS (International Congresses on Thermal Stresses)

The activities at ICTS in 2004 concentrated mostly on the preparations for the Sixth International Congress on Thermal Stresses, Thermal Stresses 2005, that will be held on May 26-29, 2005, in Vienna, Austria.

General Chair of the Congress is Franz Ziegler, who, jointly with Chair of the National Organizing Committee, Rudolf Heuer; Chair of the Program Committee, Hans Irschik; and Secretary of the Congress, Christoph Adam, constitute the group of the principal local organizers of the Congress. They are supported by Chairs of the Organizing Committee, Liviu Librescu (USA) and Yoshinobu Tanigawa (Japan); and by Co-Chairs of the Congress, Richard B. Hetnarski (U.S.A.) and Naotake Noda (Japan).

The International Organizing Committee consists of 21 members representing 11 countries, and the National Organizing Committee and the Program Committee consist jointly of eight members.

Although it is too early at this time (April 1, 2005) to predict the success (or failure) of the Congress, from all what is known, the Sixth International Congress on Thermal Stresses will be the largest congress of all held so far.

Another activity of ICTS was the initial early preparations for the Seventh International Congress on Thermal Stresses which will be held in June 2007.

The formal announcement of the site of that Congress will be made in Vienna in May, but it can be said informally, that the Seventh Congress is to be held in Taipei, Taiwan.

Report composed by Richard B. Hetnarski

IIAV (International Institute of Acoustics and Vibration)

The International Institute of Acoustics and Vibration (IIAV) at present has about 500 individual members in 55 countries. The eighth IIAV annual election was held in 2004 in which all members voted on candidates for three new officers and five new directors. The elected directors replaced the five directors whose four-year terms had expired. The five directors elected were: Chris Fuller, USA; Thomas Lago, USA; Brian Mace, UK;

Guiseppe Miccoli, Italy; and Osman Tokhi, UK. In addition, Dr. Jan Verheij of the Netherlands was elected as the IIAV President and Dr. Franz Ziegler of Austria was elected as President Elect. Both will serve two-year terms. Professor Ziegler will take up his position as President of IIAV in 2006. In addition, Dr. Barry M. Gibbs of the United Kingdom was elected as Vice President for Professional Relations to serve a four-year term.

A successful congress was held in St. Petersburg, Russia, from July 5-8, 2004. Altogether 508 delegates from 55 countries attended this, the Eleventh International Congress on Sound and Vibration (ICSV11). The technical programme included over 500 lectures arranged in 12 parallel technical sessions over a period of three and a half days. Many of the sessions were organized by members of the ICSV11 Scientific Committee. The ICSV11 technical proceedings were available to delegates at the congress itself in CD-ROM and hard copy format totaling 4600 pages. Just after the opening ceremony, Dr. Yuri I. Bobrovnskii of Moscow, Russia was awarded the seventh honorary fellow membership of the IIAV. There were altogether five plenary keynote lectures: "Mid and High-Frequency Vibration Analysis of Structures with Uncertain Properties" by Robin Langley, Cambridge University, UK; "The Ear and Hearing: Bridging Physiology and Technology" by Ruth Bentler, University of Iowa, USA; "The Acoustics of Breathing. Computer Diagnosis of Respiratory Diseases " by Victor Grinchenko, Kiev, Ukraine; "Fourier Acoustics: Uncovering the Origins of Sound" by Earl Williams, Naval Research Laboratory, Washington DC, USA; and "Wave Motion in In-Vacuo and Fluid-Filled Pipes" by Mike Brennan, ISVR, Southampton, UK. In addition four IIAV members were elevated to fellow grade in IIAV during ceremonies at ICSV11.

The Twelfth International Congress on Sound and Vibration (ICSV12) will be held in Lisbon, Portugal July 11-14, 2005 and will be hosted by the International Institute of Acoustics and Vibration in cooperation with the Acoustical Societies of Portugal and Spain and the American Society of Mechanical Engineers. A total of almost 1000 abstracts from authors from 60 countries have been received for the Twelfth Congress. All of the technical papers presented will be published and available on CD-ROM and hard paper format for participants at the Congress. In addition the technical programme including abstracts of all of the papers in hard form will be available at the Congress, and given to all ICSV12 participants

Plans are also well underway for the thirteenth congress (ICSV13) to be held in Vienna, Austria on July 3-7 2006, and the fourteenth congress (ICSV14) to be held in Cairns, Australia in July 2007.

One more organization became affiliated to IIAV in 2003-2004: The Scientific Society for Optics, Acoustics, Motion Pictures, and Theatre Technology of Hungary. Currently 33 scientific societies or similar organizations are affiliated to IIAV as cooperating societies.

Publication of the International Journal of Acoustics and Vibration (IJAV), the refereed quarterly journal of IIAV, continues well on schedule. IJAV is receiving a steady flow of good papers. IJAV is sent to all IIAV members and to a number of libraries all over the world.

Report composed by Malcolm J. Crocker

ISIMM (International Society for the Interaction of Mechanics and Mathematics)

The first activity of 2004 for the newly elected President (Prof. M. Pitteri) and Secretary (Prof. A. Montanaro) has been the transfer of the relevant papers of the Society from Berlin to Padova, and the reinstallment of the Society's web page in the server of the President's and Secretary's Department.

The most important event of 2004 for ISIMM has been the biennial meeting, held in the Lufthansa Bildungszentrum, Seeheim, Darmstadt, Germany. Professor Kolumban Hutter from Darmstadt has been the Chairman of the Organizing Committee, assisted by Dr. Y. Wang, Dr. S. Pudasaini, and Mrs. R. Rutscher.

The scientific program included 16 invited talks, 60 presentations, 21 posters and a special session in memoriam H. Zorski. It brought together more than 100 scientists from 26 countries, and offered interesting discussions and debates. Scientific interactions have been boosted also outside the lecture room by the fact that most of the participants stayed at the Bildungszentrum. This living together and the social activities included in the program have produced a lively and productive environment.

The next Symposium on Trends in Applications of Mathematics and Mechanics (STAMM) will be held in Vienna, Austria. The meeting will take place at the Vienna University of Technology, from July 10 to 14, 2006. The following colleagues have kindly agreed to serve on the advisory board:

Philippe G. Ciarlet, Patrick Huerre, Kolumban Hutter, Alfred Klumwick, Giulio Maier, Herbert Mang, Ingo Müller, Franz G. Rammerstorfer, Wilhelm Schneider, Franz Ziegler.

Additional information will be posted as soon as possible in the ISIMM web page <http://isimm.dmsa.unipd.it>

The Executive Committee of ISIMM has decided to provide two awards for doctoral dissertations written in the period 2004/2006 by young scientists and concerning one of the fields fostered by ISIMM. The financial value of each award will be Euros 500,00. The awardees will be announced during STAMM 06 in Vienna and they will be given the opportunity to present their results in a general lecture at that symposium.

All ISIMM members are called to nominate likely candidates for the award and to send copies of the dissertations along with a letter of recommendation to the president or the secretary/treasurer of ISIMM. Proposals should arrive prior to April 1st, 2006. A ranking among all proposals will be made by appropriate members of the executive committee.

The following new members have been installed in the Society:

Serge Preston (Portland), Roberto Paroni (Sassari), Chi-Sing Man (Lexington), Giorgio Bertotti (Torino), Davide Bigoni (Trento), Alain Bossavit (CNRS), Edward Della Torre (Washington D.C.), Isaak Mayergoz (Maryland), David J. Steigmann (Berkeley)

The following members have unfortunately passed away:

H. Zorski (Warsaw) and O. A. Ladyzhenskaya (St. Petersburg).

Due to the initiative of the ISIMM publication committee a series of books has come to fruition. The series is called "Interaction of Mechanics and Mathematics Series" (IMM) and is published by Springer Heidelberg. At this time eight books are in preparation, scheduled to appear from later this year on.

These and other current activities of the Society are reported in Newsletters which appear on the webpage of the Society mentioned above.

Report composed by Adriano Montanaro

ISSMO (Int. Society for Structural and Multidisciplinary Optimization)

The Society co-sponsored the 5th ASMO UK / ISSMO Conference on Engineering Design Optimization held in Stratford-upon-Avon, UK, 12 - 13 July 2004. The number of attendees was 67, and 27 papers were presented and published in the proceedings (CD-ROM).

ISSMO also co-sponsored the 10th AIAA / ISSMO Multidisciplinary Analysis and Optimization Conference, held 30 August – 1 September, 2004, in Albany, NY, USA. About 400 persons attended the conference, and 333 papers were presented and published in the proceedings (CD-ROM).

The 6th (biannual) ISSMO World Congress on Structural and Multidisciplinary Optimization (WCSMO-6) is to be held next time in Rio de Janeiro, Brazil, 29 May - 3 June, 2005, and its organization is at an advanced stage. About 570 papers have been submitted, and 450 of these have been accepted for presentation.

Please see the website <http://www.issmo.org> for more details about ISSMO.

Report composed by Niels Olhoff

Reports on ICSU and its Scientific Committees

Relations with ICSU (International Council for Science)

I attended the 'Unions meeting' of ICSU which was held on 9-10 February 2004 at the Academie des Sciences in Paris; 25 of the 27 International Scientific Unions were represented at this meeting, and engaged in wide-ranging discussions. The following is a summary of those parts of the discussions that seem relevant to IUTAM.

1. Overview address

Following welcome speeches from representatives of the Academy, from Mme Claudie Haignere (Minister responsible for Research and Technology), and from Jane Lubchenko (President of ICSU), Thomas Rosswall (Executive Director of ICSU) presented a general overview of the current ICSU strategy, its assessment of priority areas (environment and its relation to sustainable development; data and information; and capacity building). In regard to the overarching mission of ICSU (strengthening international science for the benefit of society), he referred to a strategic recommendation (which will no doubt be discussed at the ICSU General Assembly in 2005) concerning the need "to strengthen input from social/human, health, and engineering sciences". Insofar as IUTAM stands at the frontier between science and engineering technology, it may play a critical role in this respect.

2. Capacity building

During the discussion following Thomas Rosswall's presentation, reference was frequently made to the priority area of capacity building, in which many Unions are seriously involved. I was therefore glad to be able to acknowledge the support given by ICSU through its 2004 grants programme to IUTAM in the support of AIMS (the African Institute for Mathematical Sciences). This initiative attracted much favourable comment during later discussions.

3. Science in the XXIst century: challenges for UNESCO and ICSU

Walter Erdelen (representing UNESCO) addressed the subject "Science in the XXIst century: challenges for UNESCO and ICSU". He said that whereas the greatest scientific achievement of the XXth century might be seen to be the understanding of matter at the atomic level (a debatable point of view!) the problems of the XXIst century were more concerned with complex systems, collective phenomena, materials by design, multi-component devices and machines, nonlinearity, emergence, self-organisation, multiplicity of scale, irreducible uncertainty,... . No problem in agreeing with him here!

4. Energy for Sustainable Societies

Laurie Geller (ICSU Science Officer for Scientific Planning and Review) spoke on "Science and Technology for Sustainable Development and Energy for Sustainable Societies". She talked of the 'three pillars': environmental protection, economic development, and social health; and of the great need for scientific education and

capacity building. The discussion that followed ranged widely, from nuclear power for developing countries to the need to improve cooking technology (e.g. replacement of firewood stoves by solar cookers in the developing world); in all areas relating to energy production, conversion, storage, etc., IUTAM of course has an interest and relevant expertise.

5. ICSU and Developing Countries

Ana Maria Cetto (Secretary General of ICSU) reported on the setting up of regional offices in four regions of the 'developing world': Africa, Latin America and the Caribbean; Asia; and the Arab world. Agreement has been reached concerning the first two: the regional office for Africa will be in South Africa, while that for Latin America and the Caribbean will be in Mexico. Discussions are still proceeding on the other two. These regional offices will take over the responsibilities of COSTED, which has now been discharged.

6. Interaction between ICSU and its International Scientific Unions

Discussion on this perennial topic was led by Burton Richter (Member of ICSU Executive Board). ICSU evidently wishes to encourage interaction between Unions, and inter-Union activities. In this connection, I suggested that ICSU should consider offering small grants (of the order of \$10k) to support joint Symposia involving two (or possibly more) Unions. The suggestion was sympathetically received, and I hope may be taken up by the Executive Board of ICSU.

7. Science for health and well-being; the healthy sustainable food chain

Extended discussions took place on these topics which are of prime importance for the biological unions, although some issues (e.g. soil mechanics in relation to agriculture, water supply, fish farming...) could clearly involve IUTAM also. Food science is an area in which challenging problems of fluid and solid mechanics abound! Indeed we might wish to consider setting up a Working Party to cover this subject area.

8. International Years

IUGS has taken an initiative (through the UN) to proclaim an International Year of Planet Earth (IYPE) 2006, with subtitle "Earth Sciences for Society". Eight topics are identified for special emphasis:

- Groundwater for a thirsty planet
- Health and the Earth
- Sustainable mining of energy materials
- Under cities: our last frontier
- Global change shapes the Earth
- Deep Earth affecting daily life
- Oceans: the great unknown
- Coping with natural hazards

In a parallel development, ICSU has established a Planning Group for an International Polar Year 2007. The Chair of this group, Chris Rapley of the British Antarctic Survey (<cgrapley@bas.ac.uk>), gave a very dynamic presentation, and invited Union input as a

matter of urgency (!) by 15th March 2004. We should if possible alert any of our colleagues working in relevant topics, e.g. ice dynamics, to this opportunity.

9. ICSU General Assembly 2005

The 28th General Assembly of ICSU will take place in China, 16-22 October 2005. It will start with preliminary meetings in Shanghai on 16/17 October and will then transfer to Suzhou for the General Assembly itself.

10. US visa problems

Under 'any other business' the President Designate of IUPAP, Alan Astbury, drew attention to difficulties that had been experienced by scientists (specifically scientists from China) in obtaining visas to attend Symposia in USA to which they had been invited. The situation was serious, to the extent that IUPAP had informed the US authorities that it could no longer sponsor Symposia in USA unless it is made easier for invited overseas participants to obtain visas. This problem goes to the heart of the fundamental issue of 'freedom of movement' of scientists, and IUTAM should clearly be alert to any similar problems that may arise in relation to its Symposia, whether in USA or elsewhere.

Report composed by Keith Moffatt

COSPAR (Committee on Space Research)

COSPAR is one of the leading interdisciplinary scientific organizations. COSPAR objectives are carried out by the international community of scientists working through ICSU and its adhering National Academies and International scientific unions.

In 2004 the most important event of COSPAR activity was the 35th COSPAR Scientific Assembly held in Paris, France from 18 to 25 July 2004. The Assembly attracted an extremely good response from the international space science community. 4433 papers have been presented (1770 among them were posters) in the 94 events making up the core of the scientific program. In addition to the core program five interdisciplinary lectures and five panel discussions have been held. In total 3058 persons participated in the Assembly (among them 449 students), making 2004 a record year for Assembly participation.

The next COSPAR Scientific Assembly will be held in Beijing, China, 16-23 July 2006. Professor R.-L. Xu will serve as Chair of the Scientific Program Committee.

In 2004 COSPAR sponsored and co-sponsored the following meetings:
Conference on Sun-Earth Connection. Multiscale Coupling in Sun-Earth Processes. 9-13 February 2004, Kailua-Kona, Hawaii, USA.
COSPAR Colloquium on Dynamical Processes in Critical Regions of the Heliosphere. 3-10 March 2004, Dead Sea Resort, Israel.

Fourth COSPAR Capacity Building Workshop. Durban, South Africa, 28 June-9 July 2004.

Forthcoming meetings are as follows:

COSPAR Qolloquium on Spectra and Timing of Compact X-ray Binaries. 17-21 January 2005, Mumbai, India.

15th IAA/COSPAR Humans in Space Symposium. 23-27 May, Graz, Austria.

Ocean Remote Sensing, a Tool for Ocean Science and Operational Oceanography. 19-30 September 2005, Rabat, Morocco.

COSPAR Qolloquium on Mutagenic Consequences of the Space Environment. July 2006, Xi'an, China.

COSPAR continues its publication activity. In 2004 four issues of COSPAR Information Bulletin were published containing news from the space community, space mission news, the list of meetings of interest for space community, the continuation of the list of satellites and space probes launches etc.

The new issues of COSPAR journal *Advances in Space Research* appeared: Vol. 34, NN 1-5.

Report composed by G.G. Chernyi

SCOPE (Scientific Committee on Problems of the Environment)

No report has been submitted by SCOPE.

SCOR (Scientific Committee on Oceanic Research)

1. SCOR held its 27th General Meeting in Venice, Italy on 27-30 September 2004, chaired by the President, Professor Robert Duce. New officers were elected, including Bjørn Sundby (Canada), as SCOR President, and Victor Akulichev (Russia) as Vice-President. They assumed their offices at the end of the meeting.

2. Current SCOR Working Groups which may be of interest to IUTAM
 WG 111—Coupling Winds, Waves and Currents in Coastal Models
 This group is still developing a book tentatively entitled *Coupled Coastal Wind-Wave-Current Dynamics*, and will be disbanded after completing the book in late 2005.

WG 114—Transport and Reaction in Permeable Marine Sediments
 The group convened a Gordon Conference on their topic in June 2003 and was disbanded at the General Meeting.

WG 121—Ocean Mixing

This group convened a symposium in Canada in October 2004 (see www.jhu.edu/scor/WG121/Symposium.htm), which will result in a special issue of Deep-Sea Research Part 2. One of their tasks is to try to improve parameterization of mixing in numerical ocean GCMs.

3. New SCOR Working Groups which may be of interest to IUTAM.
SCOR established two new working groups. One, WG 125 on Comparisons of Zooplankton Time Series, may interest IUTAM for its statistical aspects.
4. SCOR continues to be involved in large-scale scientific programs, including
 - i) Global Ocean Ecosystems Dynamics (GLOBEC) project
The GLOBEC SSC will meet next in June 2005 in Rome, Italy.
 - ii) Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) program
The GEOHAB SSC has published its Implementation Plan, and is holding a series of small open science meetings to create detailed research plans for GEOHAB's Core Research Projects. Modeling is an important aspect of GEOHAB and will be the focus of a workshop in 2006. The GEOHAB SSC will meet next in December 2005 in Paris, France.
 - iii) Surface Ocean-Lower Atmosphere Study (SOLAS)
The Science Plan/Implementation Strategy for SOLAS was published in early 2004. Its SSC will meet next in Tokyo, Japan in June 2005.
 - iv) Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) project
IMBER's Science Plan/Implementation Strategy has been approved by SCOR and the International Geosphere-Biosphere Programme (IGBP) and will be published in mid-2005. The IMBER SSC will meet in Shanghai, China in April 2005.

Scientific Program under Development

SCOR approved at its 2003 Executive Committee meeting a new planning activity for a project called GEOTRACES, which will conduct cross-ocean transects measuring trace element and radioisotope concentrations. The GEOTRACES Science Plan will enter review in mid-2005.

5. The next meeting of SCOR will be take place in Cairns, Australia on 29 August-1 September 2005.
6. Further information can be found in the SCOR Annual Report for 2004 available in mid-2005 on the SCOR Web site (<http://www.jhu.edu/scor>) or from Dr. Ed Urban, Executive Director, SCOR, Department of Earth and Planetary Sciences, The Johns Hopkins University, Baltimore, MD 21218, USA; e-mail: Ed.Urban@jhu.edu.

Report composed by W. Fennel

Appendix: Report on ICSU Grant for Capacity Building

The following report has been provided to ICSU concerning the use that has been made of the grant of \$100k to IUTAM under the ICSU 2004 grants programme; this report is in the form required by ICSU. The grant was in fact made up as follows: \$35k from UNESCO; \$35k from the US State Department; and the balance of \$30k from ICSU itself.

1. Statement of objectives

There were three objectives stated in the grant application, all of which have been achieved:

- (i) 30 African students completed the first AIMS diploma course, which ran from September 2003 to June 2004. 45 African students are enrolled in the second year course, which started in September 2004.
- (ii) A Workshop on Capacity Building in the Mathematical Sciences was held at AIMS, Muizenberg, South Africa, 13-17 April 2004. There were 48 participants from 17 African States, and 16 from non-African States. The 30 students also contributed significantly to the discussions. This Workshop was funded by the ICSU/UNESCO grant
- (iii) A 10-day residential course (the first stage of a three-month professional development course) was held at AIMS from 6 to 16 July 2004 for 40 mathematics schoolteachers from all parts of South Africa on the subject "Mathematical Thinking, Problem Solving and Technology in Teaching and Learning Mathematics". The residential course was followed by project work conducted and supervised from AIMS on the internet.

2. Major outcome / achievements

The African Institute for Mathematical Sciences (AIMS) was launched at an Opening Ceremony and Meeting in September 2003, the beginning of its first full academic year, when 30 graduate students from 11 African States (Algeria, Cameroon, DR Congo, Ghana, Kenya, Malawi, Morocco, Nigeria, South Africa, Sudan and Zimbabwe) began their studies in a highly innovative nine-month AIMS diploma course. Located in an old hotel in Muizenberg, refurbished and equipped specifically for this purpose, and with the active involvement of three local universities (Stellenbosch, University of Cape Town and University of the Western Cape) and three European Universities (Cambridge, Oxford and l'Université de Paris-Sud 11), AIMS has been hailed as a model for North-South collaboration in capacity-building. It relies on the voluntary input and teaching of mathematical scientists from the participating universities and others in Europe and USA. These scientists, many of the highest distinction, in general spend two or three weeks at AIMS (sometimes much longer) and provide intensive teaching both in the lecture-room and in follow-up tutorial sessions. Full details are provided in the Annual Report 2003/4 of AIMS (Appendix A). The teaching is highly interactive, many courses

providing the stimulus for related computational project work using open-source software, a particular hallmark of the AIMS style and strategy.

The second main purpose of the ICSU grant was to fund a five-day workshop on capacity building in the mathematical sciences. This was held at AIMS from 13 to 17 April 2004, and was financed by the UNESCO contribution to the ICSU grant. There were 19 invited participants from Algeria, Angola, Benin, Botswana, DR Congo, Ghana, Kenya, Lesotho, Madagascar, Malawi, Morocco, Mozambique, Sudan, Tunisia, Tanzania, and Zambia, as well as a strong contingent of 29 from South Africa itself; there were also 16 invited participants from France, Netherlands, UK and USA. Together with the students of AIMS, this provided an exceptional opportunity to address many of the acute problems currently facing the academic and teaching community across Africa. A report on this Workshop is attached as Appendix B. The main issues discussed were: (i) the use of the internet for web-based teaching of mathematics in schools (see <http://www.aims.ac.za/aimssec>); (ii) the particular features of the AIMS-diploma teaching style, and possible evolution of this over the next few years; (iii) the possibility of setting up ‘sister institutes’ following the AIMS model, or alternatively the development of ‘centers of excellence’ in the mathematical sciences, in other African locations (North, East, West and Centre); and (iv) a proposal, still in its early stages, to establish an African Mathematical Institutes Network (‘AMI-Net’), with potential support from NEPAD (the New Partnership for Africa’s Development). This is an exceptionally promising initiative, whose details are set out in a draft proposal document, attached as Appendix C.

The third and final purpose of the ICSU grant to IUTAM was to provide support for AIMS-SEC, the branch of AIMS that is concerned with web-based teaching of basic mathematics in schools across Africa, and particularly across South Africa. This was achieved through the financing of a ten-day residential course (6-16 July 2004) at AIMS for teachers of mathematics in South African schools; this course was followed by three months of project work conducted via the internet. The 40 teachers accepted for the course came from all parts of South Africa (12 from Eastern Cape, 11 from Kwa Zulu Natal, 10 from the Western Cape, 4 from Limpopo, 2 from Gauteng and 1 from the Free State). The course was organised by Toni Beardon (Cambridge University) and taught by her and five other volunteers, two from Cambridge, one from Edinburgh, and one from Auckland, New Zealand. Full details are contained in the ‘Report on AIMSSEC Professional Development Course for Educators’, attached as Appendix D. It may be sufficient here to simply quote the feedback from one of the participants (the teacher from the Free State): To me the course was a life-saver! I have operated up to now in a survival mode, this has changed my way of thinking totally. The exercises were very practical and useful. I wish all maths teachers can do this. By observing the lecturers it became very clear on exactly how I must engage with my learners. I have learnt a lot on how to assess what kind of exercises to give. It also showed me that maths is fun! I will surely use all the information given to make the difference to my learners’ lives!

Summary statement of major outcome

The major outcome must surely be the successful completion of the first year's AIMS Diploma course by 30 talented young graduate mathematicians and mathematical scientists, who have now either returned with renewed intellectual vigour to their home states, or are enrolled in research programmes (many in South Africa) towards MSc or PhD degrees; also the successful completion of the first Professional Development Course held at AIMS as described above; and the successful involvement of the trans-African mathematical sciences community through the April 2004 Workshop, at which the AMI-Net proposal was initiated – a beacon for the future!

3a. Value to collaborative partnerships and wider scientific community

IUTAM's proposal to ICSU attracted an exceptional measure of support from the wider ICSU family: five sister Unions (IMU, IUGG, IUPAP, IUPAC and IAU), five national members having a particular interest in Africa and/or capacity building (South Africa, Egypt, UK, Netherlands and Brazil), and also the Third World Academy of Sciences (TWAS). Delegates from IUGG, IUPAC, IUPAP and IAU, as well as four from IUTAM, contributed to the capacity-building Workshop, which served to raise awareness within the ICSU family of the particular problems facing

Africa in relation to teaching and research in the mathematical sciences. Contact has been established with the parallel African Millenium Mathematical Sciences Initiative (AMMSI) in which IMU has been and is involved, and AIMS and AMMSI have joined forces in seeking the support of NEPAD for the AMI-Net initiative. A network of involvement of mathematical scientists across Africa, with AIMS as its hub, is now steadily gaining strength, and will continue to do so as successive cohorts of AIMS graduates eventually return to teach in their home States. TWAS has featured the AIMS phenomenon in an article *Aims for Africa* in the December 2004 issue of its Newsletter 16, 2 pp 65-7 (available for download at www.twas.org); this will help to disseminate the activity of AIMS, and to promote it as a role-model for capacity building in the developing world.

3b. Where funding was provided by UNESCO please state how this was acknowledged throughout the project implementation

The support of ICSU has been acknowledged in the Annual Report 2003/4 of AIMS and in the TWAS article mentioned above. It was also explicitly acknowledged at the General Assembly of IUTAM held in Warsaw, August 2004, and in a lecture delivered by the President of IUTAM at the concurrent Congress, ICTAM'04. UNESCO's contribution to the ICSU grant is now acknowledged on the AIMS website www.aims.ac.za.

4. Follow up activities and future implications

With the help of ICSU, AIMS is now firmly established as a model of best practice in capacity building in Africa, in a field in which such capacity building is desperately needed. It plans to expand slowly year-on-year to admit ultimately 60 graduate students per annum, and it is hoped that, with the help of the normal South African Government subsidy paid in respect of each graduating student, it will in the longer term be self-sustaining. In the meantime, AIMS still relies on donations and grants raised through an ongoing fund-raising process; the ICSU grant has been of crucial assistance in this respect, and its 'seed-funding' role is greatly appreciated.

The main associated follow-up activity is related to the AMI-Net initiative, planned to connect an expanding network of Centres of Excellence based on existing selected universities, and exploiting wherever possible the expertise, particularly in the use of open-source software, acquired by graduates of AIMS who eventually return to their home institutions. This is an ambitious project which will require significant funding (of the order of \$10M over 8 years); but this is small in relation to the potential benefits for

Africa, and the time is clearly ripe for seeking necessary support at Government level, both within Africa through NEPAD, and in the countries of the G8 for which targeted support for Africa is an acknowledged current priority.

Date: 24 March 2005
H.K.Moffatt

Agreement by and between IUTAM and Springer Science and Business Media B.V.

hereinafter referred to as "the Publisher"

WHEREAS IUTAM and the Publisher agree that Springer Science and Business Media is the official designated publisher of the proceedings of IUTAM Symposia (hereinafter referred to as "Symposia". The organizer or organizers of an IUTAM Symposium, being the chairmen of the Scientific Committee of the Symposium, are hereinafter referred to as the "Organizers");

WHEREAS IUTAM and the Publisher agree that each IUTAM proceedings volume published by the Publisher (hereinafter referred to as "Volume"), providing it is appropriate vis-a-vis subject matter, will be published in the "Solid Mechanics and Its Applications" book series, or the "Fluid Mechanics and Its Applications" book series (hereinafter referred to as the "Series");

WHEREBY, in consideration of the mutual covenants and obligations herein contained, the parties hereto have agreed and do agree as follows:

1. Publication

1. Springer Science and Business Media shall be the official publisher of the proceedings of all IUTAM Symposia. Each proceedings accepted for publication shall appear as a Volume in the Series. In those cases where it is not appropriate, the Volume will be published out-of-series in the same style and format. Each Volume will appear in a hard bound version.
2. IUTAM will inform the Organizers of IUTAM Symposia of the possibility of publishing a proceedings with the Publisher, and encourage them to contact the Publisher. Further contact between the Organizers and the Publisher will be bilateral. In addition, IUTAM will notify the Publisher sufficiently ahead of time which Symposia are to be organized and shall give the Publisher the names and addresses of the Organizers.
3. The Organizers of each individual Symposium, in accordance with the IUTAM Scientific Committee, will remain free to propose to publish the proceedings in a suitable journal. In such case, the Organizers and the Publisher shall first jointly make an effort to investigate the availability of a suitable journal of published by Springer Science and Business Media.
4. If the Organizers decide to publish a proceedings with the Publisher, as recommended by IUTAM, a separate contract will be concluded between the Organizers and the Publisher in which all details regarding publication will be settled. The terms and conditions relating to the publication of a given Volume will be a matter of negotiation between the Organizers and the Publisher, where the basic conditions are based on this present Agreement.
5. The Organizers act as the Editors of the Volume.

6. Typescripts for Volumes in the Series shall yield maximally about 450 printed pages. Exemption from this restriction can be agreed on by the Organizers and the Publisher. Further, the typescripts will not contain colour pictures or colour photographs, unless the Organizers and the Publisher agree otherwise.
7. The papers submitted for publication will be preferably in LaTeX format using the Springer style file. The style file will be made available by the Publisher, and the Publisher will assist in any questions regarding its use. The papers will be submitted in camera-ready, laser printed, form (with the original figures pasted in the typescript) according to the guidelines given by the Publisher.
8. The proceedings of IUTAM Symposia will be published as Volumes in the Series, having a uniform design and recognisable cover design, including the IUTAM logo (see article 1.2). Proceedings that will be or have been published with other publishers do not form part of the Series.
9. Both the Publisher and the Organizers will do their very best in bringing the Volume out no later than one year after the Symposium has taken place. This requires that the Volume Editors who are responsible of assembling the final typescript should deliver it on time, in consultation with the Publisher.
10. IUTAM grants the Publisher the non-exclusive rights of the use of the IUTAM logo.
11. IUTAM grants the Publisher the use of the brand name "IUTAM Symposium on". This brand name is solely reserved for proceedings Volumes based on the Symposia which have been decided upon by the IUTAM General Assembly and entrusted to the Scientific Committee of the Symposium.
12. The brand name "IUTAM Symposium on" will be an integral part of the title page and the front and back cover of each Volume, and will feature in relevant promotional material.
13. The right to publish the IUTAM Symposium proceedings is not transferable by Springer Science and Business Media to any other publisher.
14. The Volumes will be published entirely for the account and risk of the Publisher, who shall be the proprietor of the goodwill and copyrights to each individual Volume.
15. In consideration of the Publisher's obligations hereinafter mentioned, IUTAM grants to the Publisher all of its rights, title, and interest in and to the publication rights to the Volumes in any language throughout the world, including but not limited to the following: the exclusive right to print, publish and sell the Volumes in whole or in part, in book form and in any other form including, without limitation, mechanical, electronic and visual reproduction, electronic storage and retrieval systems, and all other forms of electronic publication not known or hereinafter invented. The Publisher also shall have the the exclusive authorization to license the right to translate, print, publish, or sell any no-English language edition of the Volumes, all during the unrestricted period of copyright.
16. IUTAM hereby agrees that the Publisher shall be the copyright holder of each Volume in the Series, and the Publisher shall be responsible for affixing the proper notice of copyright in each copy of each Volume.
17. The publisher agrees to publish an e-book of each IUTAM Proceedings Hardbound Edition.

2. Responsibilities

1. The Organizers, will in their role as Editors of the Volume be responsible for ensuring that each Volume satisfies the standards of high scientific quality. This requires that a reviewing procedure should be carried out of each submission to the Volume. This reviewing procedure will in general be performed by the Scientific Committee of each Symposium.
2. The Publisher will provide either directly, or through the Volume Editors, guidelines and instructions to contributing authors so as to ensure that each contribution appearing in the Volume is prepared to a consistent style and format. The Editors of each Volume shall endeavour that the typescripts are prepared in accordance with the Publisher's instructions.
3. All decisions regarding publication, promotion, prices and the sale of Volumes in the Series shall be made by the Publisher. However, at the Publisher's request, IUTAM or the Volume Editors will advise the Publisher on matters pertaining to promotion and advertisement. IUTAM will allow the Publisher the right to use its name in connection with such advertising and promotion of the Series and Volumes in the Series.
4. The Publisher will be responsible for ensuring that the Volumes are produced to a high quality in a consistent style and format.
5. IUTAM and Volume Editors warrant to ensure to the best of their ability that no material in the Series contains anything that is obscene, objectionable, indecent, or of libellous or scandalous character.

3. Payments/Complimentary Copies

1. Royalties shall not be paid to the Organizers.
2. In lieu of royalties, the Organizers will get a minimum of 2 copies of each Volume free of charge.
3. The Publisher will provide the IUTAM Bureau with 9 free copies of each Volume.
4. Participants to the Symposium will be given the opportunity to order the Volume at a special prepublication price. The special Volume price will be included in the Symposium registration fee, so that each registered Participant will automatically receive a copy of the Volume upon publication. The special price includes tax (if applicable) and postage. The special price will depend on the number of participants and the size of the Volume and will be subject to negotiation between the Publisher and the Organizers of the Symposium concerned.
5. The agreed pre-publication prices for 2005-2008 shall be as set forth in the addendum to this contract.
6. It will be the sole responsibility of the Organizers of a given Symposium to forward the appropriate, one-time payment to the Publisher. The Organizers will also supply the Publisher with adhesive labels with the names and addresses of the relevant participants.

4. Special Conditions

1. Should Springer Science and Business Media decide to send a representative to a given Symposium, the Organizers will agree to provide display space free of charge for the display of relevant publications and, possibly, the dissemination of relevant promotion material to participants in the conference portfolios.
2. Springer Science and Business Media will provide the Organizers with a subsidy of 850 Euro towards the costs of organizing the Symposium. This subsidy will be paid upon receipt of the contracts signed by the Organizers.

5. Termination

The Agreement between IUTAM and Springer Science and Business Media will remain in force for an initial period of 4 (four) years, starting January 1, 2005. The Agreement will be renewed for additional periods of 3 (three) years subject to confirmation of extension by both parties 12 months before the end of the initial 4-year period or subsequent 3-year periods. Either party may terminate the Agreement with or without cause upon 12 months written notice to the other.

6. Arbitration

All disputes that may arise in connection with this present agreement or the breach thereof shall be settled exclusively by arbitration, to be held in The Netherlands in accordance with Dutch law, and shall be conducted under the Rules of the 'Nederlands Arbitrage Instituut' (Netherlands Institute of Arbitration).

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 pays candidats à l'adhésion;
- vi) 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 18 août 2004 à Varsovie, Pologne

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 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. XIV ci-après).

X 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.

XI*** 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 XI adoptés par l'Assemblée Générale de l'Union, le 2 Septembre 1990 à Vienne, Autriche

XII 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.

XIII Les ressources financières de l'Union sont constituées par:

- a) les cotisations annuelles des «organisations adhérentes»;
- b) 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.

XIV Le nombre des représentants d'une «organisation adhérente» et le montant de la cotisation annuelle qu'elle doit acquitter sont défini dans le tableau suivant, par la catégorie à laquelle elle désire appartenir, et avec l'accord de l'Assemblée Générale.

Catégorie représentants	Nombre de de la cotisation annuelle	Nombre d'unités
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.

XV**** 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 XV adopté par l'Assemblée Générale de l'Union, le 28 Août 1994 à Amsterdam, les 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.

Procédés 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

Procédure 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;
 - d) 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 XI) 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 the following voting members:

- a) representatives of the adhering organizations (Article VIII);
- b) members of the Bureau (Article XI);
- 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 X);
- ii) Secretary of the Congress Committee (Article XII);
- iii) chairmen of the Symposia Panels;
- iv) chairmen of the Working Parties;
- v) representatives of countries applying for membership;
- vi) representatives of committees and groups of scientists, if so decided by the General Assembly.

** Article VI adopted by the General Assembly on August 18, 2004, in Warsaw, Poland

- 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 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 XIV.
- X 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.

- XI*** 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 centre 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 fulfil 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 XI adopted by the General Assembly on September 2, 1990, in Vienna, (Austria)

XII The General Assembly establishes a standing Congress Committee that 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.

XIII The financial means of the Union are formed by:

- a) the annual subscriptions of the adhering organizations;
- b) 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.

XIV 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.

XV**** 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, The 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.

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

These are only available by ordering directly from the publisher.

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 1995 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> or <http://www.iutam.info> .

1995

- 95-1 *IUTAM Symposium on Optimization of Mechanical Systems* (Stuttgart, Germany, 26-31 March 1995).
The Proceedings of the Symposium, edited by D. Bestle and W. Schiehlen, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1996. ISBN 0-7923-3830-8.
- 95-2 *IUTAM Symposium on Asymptotic Methods for Turbulent Shear Flows at High Reynolds Numbers* (Bochum, Germany, 28-30 June 1995).
The Proceedings of the Symposium, edited by K. Gersten, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1996. ISBN 0-7923-4138-4.
- 95-3 *IUTAM Symposium on Advances in Nonlinear Stochastic Mechanics* (Trondheim, Norway, 3 - 7 July 1995).
The Proceedings of the Symposium, edited by A. Naess and S. Krenk, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1996. ISBN 0-7923-4193-7.
- 95-4 *IUTAM Symposium on Nonlinear Instability and Transition in Three-Dimensional Boundary Layers* (Manchester, UK, 17-20 July 1995).
The Proceedings of the Symposium, edited by P.W. Duck and P. Hall, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1996. ISBN 0-7923-4079-5.
- 95-6 *IUTAM Symposium on Micromechanics of Plasticity and Damage of Multiphase Materials* (Paris, France, 29 August-1 September 1995).
The Proceedings of the Symposium, edited by A.Pineau and A.Zaoui, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1996. ISBN 0-7923-41388-0.

95-7 *IUTAM Symposium on Nonlinear Analysis of Fracture*
(Cambridge, UK, 3-7 September 1995).
The Proceedings of the Symposium, edited by J. Willis, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997.
ISBN 0-7923-4378-6.

95-9 *IUTAM Symposium on Combustion in Supersonic Flows*
(Poitiers, France, 2-6 October 1995).
The Proceedings of the Symposium, edited by M. Champion and B. Deshaies, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997. ISBN 0-7923-4313-1.

1996

96-1 *IUTAM Symposium on Interaction between Dynamics and Control in Advanced Mechanical Systems*
(Eindhoven, The Netherlands, 21-26 April 1996).
The Proceedings of the Symposium, edited by D.H. van Campen have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997.
ISBN 0-7923-4429-4.

96-2 *IUTAM Symposium on Innovative Computational Methods for Fracture and Damage*
(Dublin, Ireland, 30 June-5 July 1996).
The Proceedings of the Symposium, edited by P. E. O' Donoghue, M. D. Gilchrist and K. B. Broberg, have been published in the "Computational Mechanics Journal", 19, 447- 552; 20, 3-198, 1997.

96-3 *IUTAM Symposium on Variable Density Low Speed Turbulent Flows*
(Marseille, France, 7-10 July 1996). Co-sponsored by ICSU.
The Proceedings of the Symposium, edited by Louis Fulachier, John L. Lumley and Fabien Anselmet, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997. ISBN 0-7923-4602-5.

96-4 *IUTAM Symposium on Mechanics of Granular and Porous Materials*
(Cambridge, UK, 15-17 July 1996).
The Proceedings of the Symposium, edited by N.A. Fleck and A.C.F. Cocks, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997. ISBN 0-7923-4553-3.

1997

- 97-1 *IUTAM Symposium on Lubricated Transport of Viscous Materials* (Tobago, 7-10 January 1997).
The Proceedings of the Symposium, edited by Harold Ramkissoon, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1997. ISBN 0-7923-4897-4.
- 97-2 *IUTAM Symposium on Transformation Problems in Composite and Active Materials* (Cairo, Egypt, 9-12 March 1997).
The Proceedings of the Symposium, edited by Y.A. Bahei-El-Din and G.J. Dvorak, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5122-3.
- 97-3 *IUTAM Symposium on Non-Linear Singularities in Deformation and Flow* (Haifa, Israel, 17-21 March 1997).
The Proceedings of the Symposium, edited by D. Durban and J.R.A. Pearson, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5349-8.
- 97-4 *IUTAM Symposium on Variations of Domains and Free-Boundary Problems in Solid Mechanics* (Paris, France, 22-25 April 1997).
The Proceedings of the Symposium, edited by P. Argoul, M. Frémond and Q.S. Nguyen, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5450-8.
- 97-5 *IUTAM Symposium on Simulation and Identification of Organized Structures in Flows* (Lyngby, Denmark, 25-29 May 1997).
The Proceedings of the Symposium, edited by J.N. Sørensen, E.J. Hopfinger, and N. Aubry, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1999. ISBN 0-7923-5603-9.
- 97-6 *IUTAM Symposium on Discretization Methods in Structural Mechanics* (Vienna, Austria, 1-6 June 1997).
The Proceedings of the Symposium, edited by H.A. Mang and F.G. Rammerstorfer, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands 1999. ISBN 0-7923-5591-1.

- 97-7 *IUTAM Symposium on Material Instabilities in Solids*
(Delft, The Netherlands, 9-13 June 1997)
The Proceedings of the Symposium, edited by R. de Borst en E. van der Giessen, have been published by John Wiley & Sons, Chichester, UK, 1998 . ISBN 0-471-97460-9.
- 97-8 *IUTAM Symposium on Statistical Energy Analysis*
(Southampton, UK. 8-11 July 1997).
The Proceedings of the Symposium, edited by F.J. Fahy and W.G Price, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998, ISBN 0-7923-5457-5.
- 97-9 *IUTAM Symposium on Rheology and Computation*
(Sydney, Australia, 20-25 July 1997).
No formal Proceedings of the Symposium have been published. Selected papers have been published in several 1999-volumes of the "Journal of Non-Newtonian Fluid Mechanics", with a footnote attached to each of those papers.
- 97-10 *IUTAM Symposium on New Applications of Nonlinear and Chaotic Dynamics in Mechanics*
(Ithaca, NY, USA, 27 July-1 August 1997).
The Proceedings of the Symposium, edited by Francis C. Moon, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5276-9.
- 97-11 *IUTAM Symposium on Computational Methods for Unbounded Domains*
(Boulder, USA, 3-7 August 1997).
The Proceedings of the Symposium, edited by Thomas L. Geers, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5266-1.
- 97-12 *IUTAM Symposium on Micro- and Macrostructural Aspects of Thermoplasticity*
(Bochum, Germany, 25-29 August 1997).
The Proceedings of the Symposium, edited by O.T. Bruhns and E. Stein, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5265-3.
- 97-13 *IUTAM Symposium on Dynamics of Slender Vortices*
(Aachen, Germany, 31 August - 3 September 1997).
The Proceedings of the Symposium, edited by E. Krause and K. Gersten, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5041-3.

- 97-14 *IUTAM Symposium on Rheology of Bodies with Defects*
(Beijing, China, 2-6 September 1997).
The Proceedings of the Symposium, edited by Ren Wang, have been published by Kluwer Academic Publishers, Dordrecht, The Netherlands, 1998. ISBN 0-7923-5297-1.
- 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. Khariff, 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/Heidelberg/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.

- 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, will be published by Kluwer Academic Publishers, Dordrecht, The Netherlands, in 2002.

- 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 Science Ltd. as a special issue of the International Journal of Solids and Structures, number 39, 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. Karihaloo, 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. Bajer 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

- 03-2 *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)

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, Heidelberg 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.

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> or <http://www.iutam.org> or <http://www.iutam.info> .

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