INTERNATIONAL UNION OF THEORETICAL AND
APPLIED MECHANICS

REPORT 1994

Technical University of Vienna
AUSTRIA
CONTENTS

Bureau ................................................................. 6
Secretariat ......................................................... 6
Past Officers ...................................................... 6
Past Congress Presidents ....................................... 7
Adhering Organizations .......................................... 7
Affiliated Organizations .......................................... 14
Members of the General Assembly ......................... 17
Members of the Congress Committee ..................... 18
Members of the Sympoisa Panels .............................. 19
Reports of IUTAM Symposia held in 1994 ................. 19
International Symposium on Visco-Elastic Fluids ....... 63
Report on Fifth IUTAM International Summer School . 65
Donations in 1994 .................................................. 69
Representation in other organizations .................... 69
TREASURER’S REPORT ............................................ 70
Summary Record of the General Assembly of IUTAM, 1994 75
Members of the Congress Committee ..................... 110
Report on International Centre for Mechanical Sciences (CISM) . 112
Report on International Committee on Rheology (ICR) .... 114
Report on EUROMECH—European Mechanics Society ... 114
Report on International Association for Vehicle System Dynamics (IAVSD) .... 116
Report on The Activities of the International Association for Computational Mechanics (IACM) .......... 119
Report on The Caribbean Congress of Fluid Dynamics (CACOFD) .... 120
Report on The International Association for Boundary Element Methods (IABEM) .... 120
Report on Committee on Data for Science and Technology (CODATA) ........ 121
Report on The Activities of the Committee on Space Research (COSPAR) ....... 122
Report on Committee on Science and Technology in Developing Countries/International Biosciences Networks (COSTED/IIBN) .... 123
Report on International Commission on Acoustics .......... 123
Report on Scientific Committee On Oceanic Research (SCOR) .... 124
Statuts de l’Union Internationale de Mécanique Théorique et Appliquée .... 125
Règles de fonctionnement du Comité des Congrès de l’Union .... 129
Procéédé pour l’élection du Bureau de l’IUTAM ........ 130
Procédure pour l’élection de membres coopérés par l’Assemblée Générale .... 131
Statutes of the International Union of Theoretical and Applied Mechanics .... 132
Rules of procedure for the Congress Committee of IUTAM .......... 136
Procedure for election of the Bureau of IUTAM .......... 137
Procedure for electing Members-at-Large of the General Assembly .... 138
List of Publications ................................................. 139
List of Addresses .................................................. 163
# Bureau

The following members of the Bureau of IUTAM have been elected for the period 1 November 1992 to 31 October 1996:

**Officers:**
- Professor L. van Wyngaarden (The Netherlands) **President**
- Professor P. Germain (France) **Vice-President**
- Professor B.A. Boley (USA) **Treasurer**
- Professor F. Ziegler (Austria) **Secretary-General**

**Members:**
- Professor G.G. Chernyi (Russia) **elected (1988)**
- Professor H.K. Moffatt (UK) **(1992)**
- Professor W. Schiehlen (Germany) **(1992)**
- Professor T. Tatsumi (Japan) **(1992)**

## Secretariat

IUTAM-Secretariat, Institut f. Allg. Mechanik, Tech University of Vienna, Wiedner Hauptstr. 8-10/E201, A-1040 Vienna, Austria
Telephone: ++43 1 58801-5530, Telefax: ++43 1 5876093
Telex: +++61 3222467=TUW

## Past Officers

<table>
<thead>
<tr>
<th>Year</th>
<th>President</th>
<th>Vice-President</th>
<th>Treasurer</th>
<th>Secretary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td>J. Péres</td>
<td>R.V. Southwell</td>
<td>H.L. Dryden</td>
<td>J.M. Burgers</td>
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<tr>
<td>(France)</td>
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<td>1956</td>
<td>F.K.G. Odvquist</td>
<td>H.L. Dryden</td>
<td>G. Temple</td>
<td>M. Roy</td>
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<td>G. Temple</td>
<td>F.K.G. Odvquist</td>
<td>W.T. Koiter</td>
<td>M. Roy</td>
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<td>M. Roy</td>
<td>G. Temple</td>
<td>W.T. Koiter</td>
<td>H. Görtler</td>
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<td>1968</td>
<td>W.T. Koiter</td>
<td>M. Roy</td>
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<td>F.I. Niordson</td>
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<td>H. Görtler</td>
<td>W.T. Koiter</td>
<td>D.C. Drucker</td>
<td>F.I. Niordson</td>
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<td>1976</td>
<td>F.I. Niordson</td>
<td>H. Görtler</td>
<td>D.C. Drucker</td>
<td>J. Hult</td>
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<tr>
<td>(Denmark)</td>
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<td>1980</td>
<td>D.C. Drucker</td>
<td>F.I. Niordson</td>
<td>E. Becker</td>
<td>J. Hult</td>
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<td>(USA)</td>
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<td>1984</td>
<td>J. Lighthill</td>
<td>D.C. Drucker</td>
<td>L.v. Wijngaarden</td>
<td>W. Schiehlen</td>
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# Past Congress Presidents

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

# Adhering Organizations

**Argentina (1959)**
Asociación Argentina de Mecánica Computacional, Güemes 3450, 3000 Santa Fe
Chairman: Dr. S.R. Idelsohn
Representative: Dr. S.R. Idelsohn

**Australia (1964)**
The Australian National Committee for Theoretical and Applied Mechanics of the Australian Academy of Sciences, GPO Box 783, Canberra City, ACT 2601
Chairman: Prof. J.R. Booker
Representative: Prof. B.L. Karihaloo

**Austria (1951)**
Austrian National Committee for Theoretical and Applied Mechanics, Österreichische Akademie der Wissenschaften, Dr.-Ignaz-Seipel-Platz 2, A-1010 Wien
Chairman: Prof. H. Mang
Representative: Prof. A. Kluwick
Belgium (1949)
The National Committee for Theoretical and Applied Mechanics of the Class of Sciences of the Royal Belgian Academy, Hertogastraat 1, B-1000 Brussels
President: Prof. R. Dechaene
Vice-President: Prof. M. Geradin
Secretary: Prof. W.P. de Wilde
Representatives: Prof. M.J. Crochet, Prof. R. Dechaene, Prof. W.P. De Wilde

Brazil (1982)
Associação Brasileira de Ciências Mecânicas, Avenida Rio Branco 124/18 Andar, 20040-001 Rio de Janeiro
President: Prof. A.P. Ripper
Representative: Prof. L. Bevilacqua

Bulgaria (1969)
Bulgarian National Committee for Theoretical and Applied Mechanics at the Bulgarian Academy of Sciences, "Acad. G. Bonchev" str.bl. 4, BUL-1113 Sofia
President: Prof. St. Radev
Secretary: Prof. M. Mihovski
Representative: Prof. St. Radev

Canada (1963)
The National Research Council of Canada, Ottawa, Canada K1A OR6
President: Dr. Arthur Carty
National Committee for IUTAM, Chairman: Prof. S.B. Savage
Secretary: Prof. S. Dost
Representatives: Prof. S. Dost, Prof. F.P.J. Rimrott, Prof. S.B. Savage, Prof. B. Tabarrok

China (1980)
The Chinese Society of Theoretical and Applied Mechanics, 15 Zhong Guan Cun Road, Beijing 100080
Chairman: Prof. Feng-Gan Zhuang
Representatives: Prof. You-Sheng He, Prof. K.C. Hwang, Prof. Ren Wang, Prof. Zhe-Min Zheng

Croatia (1994)
Croatian Society of Mechanics, Ivana Lucica 5, HR – 41000 Zagreb
President: Prof. Vicko Simic
Representative: Prof. Ivo Alfirevic

Czech Republic (1993), (former Czechoslovakia (1949))
The National Committee of Theoretical and Applied Mechanics, Academy of Sciences of the Czech Republic, Institute of Thermomechanics, Dalejskova 5, CS-18200 Prague 8
President: Dr. R. Dvorak
Secretary: Dr. M. Okrouhlik
Representative: Dr. R. Dvorak

Denmark (1949)
The Royal Danish Academy of Sciences and Letters, H.C. Andersens Boulevard 35, DK-1553 Copenhagen V.
President: Dr. Erik Dal
Secretary: Prof. Dr. Thor A. Bak
National Committee for Theoretical & Applied Mechanics
Representatives: Prof. N. Olhoff, Prof. P.T. Pedersen

Egypt (1976)
Academy of Scientific Research and Technology, 101, Kasr El Eini Street, Cairo
Chairman: Prof. M.K. Ismael
Vice-President Correspondent: Prof. H.A. Morsy
Secretary: Dr. M.M.A. Nassar
Representative: Prof. M.A. Ismael

Estonia (1992)
Estonian Committee for Mechanics, Akadeemia tee 21, EE-0026 Tallinn
Chairman: Prof. J. Engelbrecht
Representative: Prof. J. Engelbrecht

Finland (1952)
The Finnish National Committee on Mechanics, Helsinki University of Technology, SF - 02150 Espoo 15
Chairman: Prof. M.A. Ranta
Secretary: Prof. M.J. Mikkola
Representatives: Prof. M.J. Mikkola, Prof. M. A. Ranta

France (1949)
Comité National Français de Mécanique, Académie des Sciences, 23, quai Conti, F - 75006 Paris
President: Prof. H. Cabannes
Secretary: Prof. A. Lagarde
Representatives: Prof. G. Iooss, Prof. R. Moreau, Prof. M. Roseau, Prof. J. Salençon
Germany (1950)
Deutsches Komitee für Mechanik (DEKOMECH), Institut für Baumechanik und Numerische Mechanik, Universität Hannover, Appelstraße 9 A, D-30167 Hannover
Chairman: Prof. W. Schiehlen
Secretary: Prof. E. Stein
Representatives: Prof. U. Gabbert, Prof. E. Krause, Prof. G. Kuhn, Prof. S. Wagner

Greece (1979)
Hellenic Society for Theoretical and Applied Mechanics, National Technical University of Athens, GR-10682 Athens
President: Prof. P.S. Theocaris
Secretary: Prof. D. Beskos
Representative: Prof. A.N. Kounadis

Hungary (1948)
Hungarian National Committee for IUTAM, Department of Mechanics, Technical University Budapest, Müegyetem rkp. 3, H-1521 Budapest
President: Prof. S. Kaliszky
Secretary: Dr. G. Stepán
Representative: Prof. S. Kaliszky

India (1950)
The Indian National Committee for Theoretical and Applied Mechanics of the Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi - 110002
Chairman: Prof. V. Ramamurti
Secretary: Prof. V.A. Chandrasekaran
Representatives: Prof. V.A. Chandrasekaran, Prof. B.C. Majumdar, Prof. V. Ramamurti

Ireland (1984)
Irish National Committee for Theoretical and Applied Mechanics, Royal Irish Academy, 19 Dawson Street, Dublin 2
Chairman: Prof. J.N. Flavin
Secretary: Prof. P.F. Hodnett
Representative: Prof. J.N. Flavin

Israel (1950)
The Israel Society of Theoretical and Applied Mechanics, Dept. of Mechanical Engineering, Technion–Israel Institute of Technology, Haifa 32000
President: Prof. S.R. Bodner
Representatives: Prof. S.R. Bodner, Prof. Z. Hashin

Italy (1949)
President: Prof. Enrico Marchi
Secretary: Prof. Angelo Moro
Representatives: Prof. G. Bianchi, Prof. C. Cercignani, Prof. P. Podio-Guidugli, 4th representative vacant

Japan (1951)
The National Committee for Theoretical and Applied Mechanics of the Science Council of Japan, 22-34 Roppongi 7-chome, Minato-ku, Tokyo 106
President: Prof. Y. Yamamoto
Representatives: Prof. K. Kawata, Prof. H. Nakagawa, Prof. T. Tatsumi, Prof. Y. Yamamoto

Korea, Republic (1990)
Korean Society of Theoretical and Applied Mechanics, Department of Aerospace Engineering, Seoul National University, Seoul 151-742
President: Prof. Chol-Hui Pak
Secretary: Prof. Scung Jo Kim
Representatives: Prof. Chol-Hui Pak, Prof. Hang Shoon Choi

Latvia (1992)
Latvian National Committee for Mechanics, Latvian Academy of Sciences, Turgevena iela, 19, Riga LV 1524
President: Prof. V. Tamuzs
Vice-President: Prof. A. Cebers
Representative: Prof. V. Tamuzs

Netherlands (1952)
Department for Mechanics of the Royal Institution of Engineers in the Netherlands, Philips Research Laboratories, Building WA-P626, P.O. Box 800 00 513, NL-5600 JA Eindhoven
President: Dr. J.F. Dijksman
Representatives: Prof. J.A. Battjes, Prof. D.H. van Campen, Dr. J.F. Dijksman

New Zealand (1979)
The Royal Society of New Zealand, P.O. Box 598, Wellington
President: Prof. F.M. Black. Executive Officer: Mr. V.R. Moore
Representative: Prof. I. Collins

Norway (1949)
The National Committee on Theoretical and Applied Mechanics, Norwegian Academy of Sciences and Letters, Dept. of Mathematics, University of Oslo, P.O.Box 1053, Blindern, N-0316 Oslo 3
President: Prof. B. Gjevik
Representative: Prof. B. Gjevik
Poland (1952)
Committee for Mechanics of the Polish Academy of Sciences, ul. Swietokrzyska 21, PL-00 049 Warszawa
President: Prof. J. Elsner
Representatives: Prof. W. Gutkowski, Prof. H. Zorski

Portugal (1968)
Portuguese National Committee for Theoretical and Applied Mechanics, Laboratorio Nacional de Engenharia Civil, Avenida do Brasil 101, P-1799 Lisboa Codex
Chairman: Prof. E.R. de Arantes e Oliveira
Vice-Presidents: Prof. A. Ribeiro Gomes, Prof. J. Novais Barbosa
Representative: Prof. E.R. de Arantes e Oliveira

Russia (1956) (former USSR from 1956–1991)
Russian National Committee on Theoretical and Applied Mechanics, Prospetsk Vernadskogo 101, Moscow 117526
President: Prof. I.F. Obraztsova
Secretary: Prof. G.K. Mikhailov
Representatives: Prof. G.G. Chernyi, Prof. K.V. Frolov, Prof. G.K. Mikhailov, Prof. I.F. Obraztsova

Saudi Arabia (1988)
King Abdulaziz City of Science and Technology, Int. Co-op. Dept., Director: Saud Al Mubarak, P.O. Box 6086, Riyadh 11442
President: Dr. S.A. Al-Athel
Representative: Dr. Saleh A. Al-Athel

Slovakia (1993) (former Czechoslovakia (1949))
The Slovak Society for Mechanics, Council of Scientific Societies, Stefánika 49, SK – 811 04 Bratislava
President: Prof. J. Brilla
Representative: Prof. J. Brilla

Slovenia (1994)
Slovene Mechanics Society Mechanical Engineering Department, Faculty of Technical Sciences, Smetanova 17, SLO-62000 Maribor
Prof. dr. Maks Oblak
Mr. Iztok Ciglaric
Representative: Prof. Miran Saje

South Africa (1994)
Foundation for Research Development (FRD), Association for Theoretical and Applied Mechanics (SAAM), South African ICSU Secretariat, P.O. Box 2600, Pretoria 0001
President: Professor J.B. Martin
Representative: Prof. J.B. Martin

Spain (1950)
The National Institute of Aerospace Technology, "Esteban Terradas", Carretera de Alajír km. 4, Torrejón de Ardoz, E-28850 Madrid
Representative: Prof. J.M. Quintana Gonzales

Sweden (1950)
Swedish National Committee for Mechanics, Department of Mechanics & Hydromechanics, Royal Institute of Technology, S10044 Stockholm
President: Prof. F. Bark
Secretary: Prof. H. Gustavsson
Representatives: Prof. F. Bark, Dr. G. Drougge, Prof. B. Lundberg

Switzerland (1950)
Board of the Federal Institutes of Technology, (Rat der Eidgenössischen Technischen Hochschulen), ETH-Zentrum, CH-8092 Zürich
President: Vacant
Vice-President: Prof. Heidi Diggelmann, MD
Secretary-General: Dr. Johannes Fulda
Representatives: Prof. P.A. Monkewitz, Prof. M. Sayir

Turkey (1977)
Turkish National Committee of Theoretical and Applied Mechanics, Istanbul Teknik Üniversitesi, Fen-Edebiyat Fakültesi, Maslak 80626 Istanbul
President: Prof. Esin Inan
Secretary-General: Prof. Yalçın Aköz
Representative: Prof. E. Inan

UK (1948)
The Royal Society, 6 Carlton House Terrace, London SW 1Y 5AG
Executive Secretary of the Royal Society: Dr. P.T. Warren
Chairman of UK Panel for IUTAM: Prof. W.G. Price
Secretary of UK Panel for IUTAM: Prof. J.R. Willis
Representatives: Prof. C.R. Calladine, Prof. T.J. Pedley, Prof. W.G. Price, Prof. J.R. Willis

Ukraine (1995)
National Academy of Sciences of Ukraine, 54, Volodymyrska Street, Kiev 252601
President: Prof. B.E. Paton
Chairman of the National Committee of Ukraine on Theoretical & Applied Mechanics: Prof. A.N. Guz
Representatives: Prof. A.N. Guz', Prof. V.V. Pilipenko
USA (1949)
The U.S. National Committee on Theoretical and Applied Mechanics, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, DC, 20418
Chairman: Prof. G. Leal
Vice-Chairman: Prof. J.T. Oden
Secretary: Prof. Philip G. Hodge, Jr.
Representatives: Prof. H. Aref, Prof. L.B. Freund, Prof. P.G. Hodge Jr.,
Prof. G. Leal, Prof. J.T. Oden

Vietnam (1990)
Vietnamese Association of Mechanics (VAM), Hoi Co Hoc Viet Nam, 224 Doi Can, Hanoi
President: Prof. Do Sanh
Secretary: Prof. Pham Huyen
Representative: Prof. Van Dao Nguyen

Yugoslavia (1952)
Yugoslav Society of Mechanics, Fac. of Mechanical Engineering, University of Belgrade, 27. Marta 80, YU-11000 Beograd
President: Prof. V. Djordjevic
Secretary: Prof. R. Nikolic
Representative: Prof. D. Ruzic

Affiliated Organizations

CISM (1970)
International Centre for Mechanical Sciences, Palazzo del Torso, Piazza Garibaldi, I-33100 Udine, Italy
President: Avv. Vinicio Turello
Secretary-General: Prof. G. Bianchi
Rectors: Prof. S. Kaliszyk, Prof. M. Sayir, Prof. W. Schneider
Representative: Prof. G. Bianchi
Representative of IUTAM in CISM: Prof. Leen van Wijngaarden

ICHMT (1972)
International Centre for Heat and Mass Transfer, P.O. Box 522, YU-11000 Beograd, Yugoslavia
President: Prof. Y. Mori
Secretary-General: Prof. N. Afgan
Representative: Prof. N. Afgan
Representative of IUTAM in ICHMT: Prof. L.I. Sedov

ICR (1974)
International Committee on Rheology, Prof. D.F. James, Dept. of Mechanical Engrg., University of Toronto, Toronto Ont MSS 1A4, Canada
Chairman: Prof. J. Mewis
Secretary: Prof. D.F. James
Representative: Dr. J.R.A. Pearson
Representative of IUTAM in ICR: Prof. F.I. Niordson

EUROMECH - European Mechanics Society (1978)
European Mechanics Council, Prof. B. Lundberg, School of Engineering, Uppsala University, Box 534, S-75121 Uppsala, Sweden
President: Prof. D.G. Crighton
Secretary General: Prof. B. Lundberg
Representative: Prof. B. Lundberg
Representative of IUTAM in EUROMECH: Prof. L. van Wijngaarden

IAVSD (1977)
International Association for Vehicle System Dynamics, Prof. R.S. Sharp, School of Mechanical Engineering, Cranfield University, Wharley End, Bedford MK43 OAL, UK
President: Prof. H.G. Pacejka
Secretary: Prof. R.S. Sharp
Representative: Prof. R.S. Sharp
Representative of IUTAM in IAVSD: Prof. W. Schiehlen

ISIMM (1978)
President: Prof. R.J. Knops
Vice-President: Prof. H. Zorski
Secretary: Prof. D.F. Parker
Representative: Prof. M.A. Hayes
Representative of IUTAM in ISIMM: Prof. G.Iooss

ICF (1978)
International Congress on Fracture, Prof. T. Yokobori, Inst. for Fracture and Safety, Doya Building 802, 17-18 I-Chome Kamisugi, Sendai 980, Japan
Founder President: Prof. T. Yokobori
President: Prof. D. Francois
Secretary-General: Prof. T. Yokobori
Representative: Prof. T. Yokobori
Representative of IUTAM in ICF: Prof. J. Hult
ICM (1982)
International Congress on Mechanical Behaviour of Materials, Prof. T. Inoue, Department of Mechanical Engineering, Kyoto University, Kyoto 606-1 J. Japan
President: Prof. T. Inoue
Vice-President: Prof. J. Carlsson, Prof. K.J. Miller, Prof. M Yan
Secretary: Prof. T. Hoshide
Representatives: Prof. T. Inoue
Representative of IUTAM in ICM: Prof. D.C. Drucker

AFMC (1982)
Asian Fluid Mechanics Committee, Prof. R. Narasimha, Centre for Atmospheric Sciences, Indian Institute of Science, Bangalore 560 012
Chairman: Prof. R. Narasimha
Representative: Prof. R. Narasimha
Representative of IUTAM in AFMC: Prof. I. Imai

IACM (1984)
International Association for Computational Mechanics, Department of Structural Mechanics, Chalmers University of Technology, S-41296 Gothenburg, Sweden
President: Prof. J.T. Oden
Secretary: Prof. A. Samuelsson
Representative: Prof. J.T. Oden
Representative of IUTAM in IACM: Prof. E.R. de Arantes e Oliveira

CACOFD (1992)
Caribbean Congress of Fluid Dynamics, e/o The Department of Mathematics, The University of the West Indies, St. Augustine, Trinidad, W.I., West Indies
President: Dr. H. Ramkissoon
Vice Presidents: Dr. C. Depradine, Prof. F.M. Perez, Prof. C. Trevino
Secretary: Dr. G. Shrivastava
Representative: Dr. H. Ramkissoon

IABEM (1994)
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Prof. D. Dvorak (Czech Republic)  Prof. H.K. Moffatt (UK)
Prof. J. Engelbrecht (Estonia)  Prof. P.A. Monkewitz
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Prof. M.A. Hayes (Ireland)  Prof. T. Inoue (Japan)
Prof. D.C. Drucker (USA)  Prof. M.A. Hayes (Ireland)
**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 1992 for the period up to and including the 1996 meeting of the General Assembly:

**Fluid Mechanics**

- Prof. A. Acrivos (USA), Chairman
- Prof. K. Gersten (Germany)
- Prof. H.K. Moffatt (UK)
- Prof. R. Narasimha (India)
- Prof. T. Tatsumi (Japan)

**Solid Mechanics**

- Prof. J. Salençon (France), Chairman
- Prof. J.D. Achenbach (USA)
- Prof. G. Maier (Italy)
- Prof. K. Sobczyk (Poland)
- Prof. B. Storåkers (Sweden)

### Reports of IUTAM Symposia held in 1994

- **94-1**
  - IUTAM Symposium on Liquid-Particle Interaction in Suspension Flows, 18-22 April 1994, Grenoble, France.

**Scientific Committee**

- F. BARK (Sweden), Co-Chairman
- G. COGNET (France), Co-Chairman
- A. ACRIVOS (USA)
- W. SCHNEIDER (Austria)
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- (The Netherlands)
- J.C.R. HUNT (UK)
- S. ZAHORSKI (Poland)
- J. MELLEMA (The Netherlands)

**Short summary of scientific progress achieved**

Numerous natural phenomena and industrial processes are concerned by suspension flows. The aim of the Symposium was to gather scientists who work on this subject according to theoretical as well as an experimental approach. For such researches not only mechanical aspects but also physicochemical factors have to taken into account.

This meeting was organized in seven Sessions including thirty four
presentations (30 min). Five of these Sessions were introduced by a key-
lecture (60 min) and one was mainly devoted to ten short communications
(10 min).

Particle interactions and transport properties of suspensions were presented
in the first Session. Rheology of colloidal suspensions and latex dispersions
was described, the influence of shear on concentrated viscoelastic and
semidilute suspensions was discussed.

Suspension flows in industrial situations were approached in Session 2 such
as fluidized bed, transport of granular materials, liquid metal flow with
inclusion emulsion stability and flow of gel beads.

Session 3 has expressed the interest and the progress in the understanding of
the effects of surfactants on the particles and their deformation.

The motion of particles in flows was presented in Session 4, it specially
concerned the case of capsules and cells.

The important situation of particles in turbulent flows was discussed in
Session 5: transport properties in bulk flow or near the wall, pseudo-
turbulence and dispersion. Modelling of particle interactions and experimental
results were proposed.

Microcapsule, fiber and settling sphere suspensions were important
contributions in Session 6.

The last Session 7 was devoted to instabilities, oscillations and waves in
suspension.

A concluding discussion specifically pointed out the importance on the
liquid-particle interactions of surface effects.

Countries represented and number of participants:

<table>
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TOTAL 73

Proceedings of the Symposium:

The Proceedings of the Symposium will be published by Kluwer and are due

Financial support:

Financial support for the symposium was generously provided by the
International Union of Theoretical and Applied Mechanics, the International
Science Foundation, the Centre National de la Recherche Scientifique
(CNRS), the Association Universitaire de Mécanique (AUM) and the Institut
National Polytechnique of Grenoble (INPG), department of Industrial
Engineering (ENSIG).

SCIENTIFIC PROGRAM

Session 1: Particle interactions and transport properties of suspensions

Chairperson: F. BARK
R.J. WAKEMAN and G. AKAY - Key-lecture - Membrane-solute and
liquid-particle interaction effects in solid/liquid separation
C. ALLAIN, M. CLOITRE - Viscosity in concentrated coloidal silica
suspensions
J. MELLEMA, R. DE ROOIJ, A. POTANIN, D. VAN DEN ENDE -
Rheology of weakly aggregating latex dispersions
A.T. UNWIN, P.S. HAMMOND - A simple phenomenological model for
shear driven particle migration in concentrated viscoelastic suspensions
J. BLAWZDZIEWICZ, M.L. EKIEL-JEZEWSKA - Self-mobility of a
semidilute suspension under shear

Session 2: Suspension flows in industrial and natural conditions

Chairperson: R.J. WAKEMAN
G. CHEBO, A. BACHOC, V. MILISIC - Characterization of suspended
solids in urban wet weather discharges
E.O. SCHULTZ-DUBOIS and H. VAN RADEKE - Experimental study of
physical processes which determine the onset of erosion as described by the
shelf function
J. MARTIN, N. RAKOTOMALALA, D. SALIN - Hydrodynamic dispersion
in fluidized beds
G. RISTOW - Numerical simulations of granular materials in fluids
Chairperson: J. MELLEMA
E. PAUTY, C. SZTUR, J. ETAY - Experimental and phenomenological
studies of the inclusion transport in a real flow
S. HARTLAND and S.A.K. JEELANI - Effect of interfacial tension
gradients on emulsion stability
F. LEQUEUX, D. GROSSHAM, R. HOCQUARD - Shear flow experiments
in an assembly of gel beads and moulding of Bingham behavior

Session 3: Effect of surfactants. Particles deformation

Chairperson: A. GYR
Ch. MALDARELLI - Key-lecture- The effects of absorbed surfactant
molecules on the movement and deformation of bubbles and drops
K.J. STEBE and D. BARTHES-BIZELE: Marangoni effects of adsorption-
desorption controlled surfactants on the leading end of an infinitely long
bubble in a capillary
H. BEIERSDORFER, H.W. BEWERDORFF, A. GYR: Flows with surfactants at maximum drag reduction
Chairperson: D. BARTHES-BIESEL
S.P. SUTERA, A.J. MILLOUS, G.I. ZAHALAK: Surface shear viscosity of red cell membrane from rheoscopic observation
O.I. VINOGRADOVA: Coagulation of hydrophobic and hydrophilic solids under dynamic conditions
NGUYEN VAN DIEP: Theory of deformable particle-fluid motion

Session 4: Motion of particles in flows
Chairperson: S.P. SUTERA
D. BARTHES-BIESEL - Key-lecture: Motion of capsules and cells in flows
H. NICOLAI, E. GUZZELLI: Particle velocity fluctuations of sedimenting non brownian spheres: Effect of vessel size
J. ETAY, M.A.L. AMIR, Y. FAUTRELLE: Dynamics of electromagnetically driven spheres in liquid
Chairperson: E.O. SCHULTZ-DUBOIS
E.V. KREMER: Vibrational liquid-bubble interaction and acoustic induced flow of gas suspension
A.N. OSIPSOV: Boundary layers in viscous medium carrying inertial particles
M.J. DAVIS: Low Reynolds number oscillations due to disks, rings and screens

Session 5: Turbulent flows with particles, drops and electroactive species
Chairperson: S.A. MARTEMYANOV
G. HETSRONI - Key-lecture: Particle-liquid flow and heat transfer in turbulent boundary layer
D. LHUILLIER, R.I. NIGMATULIN: Some results for pseudo-turbulence in liquid-solid mixtures
T.D.M. SPLET and A. BIESHEUVEL: The dispersion of bubbles in turbulent flows
Chairperson: G. HETSRONI
S.A. MARTEMYANOV, G. COGNET: Near wall turbulent diffusivity in newtonian and suspension flows
O. SIMONIN: Modelling of the interaction between particles and fluid turbulence in dilute liquid/solid two-phase flow
V.F. NIKITIN, N.N. SMIRNOV, V.R. DUSHIN, I.N. ZVEREV, G.M. MACHVILADZE, S.E. YAKUSH: Numerical modelling of the motion of liquid particles suspended in a turbulent atmospheric flow

Session 6:
Chairperson: NGUYEN VAN DIEP
H.REHAGE: From two-dimensional model networks to microcapsules
C. ALLAIN, M. CLOITRE, A. MONGRUEL: Rigid fiber suspensions in elongational flows
F. FEUILLEBOIS, D. BRUNEAU, R. ANTHORE: On the intrinsic convection in a dilute settling suspension of spheres

Short communications:
Chairperson: D. FRUMAN
H.R. BRAND: Restriction imposed on constitutive equations by symmetries and the second law of thermodynamics
P.C. DUINEVELD: Bouncing and coalescence of two bubbles in water
V. SOBOLIK, B. BENABES, G. COGNET: Taylor-Couette instabilities of fibre suspensions
P. FRANCOIS and O. SCRIVENER: Experimental study of the three dimensional motion of a freely falling sphere in an oscillating fluid
J. BLAWZDZIEWICZ and G. ZAMEL: Structure and rheology of a semidilute suspension under shear
J.J. SMULSKY: The flow-particle interaction in the swirling potential flow
O.M. KISELEV and S.K. ZARIPOV: Numerical analysis of aerosol flows by means of velocity hodograph variables
F.M. DENNERY: Thermodynamic features of microdrops and microbubbles
A.N. SVIRIDOV: Research of naturally determined removals of microscopic particles from surfaces
B. NSOM: Lateral migration of rod-like macroscopic particles in flow between rotating cylinders

Session 7: Instabilities, oscillations and waves in suspension
Chairperson: Y.A. SERGEEV
U. SCHAFLINGER - Key-lecture: Viscous resuspension of a sediment under laminar conditions
G.I. BURDE: One type of stability problem for a fluid containing settling particles
Chairperson: U. SCHAFLINGER
Y.A. SERGEEV: Linear and non-linear concentration waves in magnetically stabilized fluidized beds
N.S. BAKHVALOV, M.E. EGLIT: Long waves in mixtures. Results of mathematical homogenization theory
L. PETIT, P. GONDRET: Hydrodynamic study of macroscopic mono and bidisperse suspensions under oscillating shear

F. Bark and G. Cognet

Scientific Committee
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Prof. L. van Wijngaarden (The Netherlands), Co-Chairman
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Prof. J.M. Delhaye (France) Prof. A. Prosperetti (USA)
Prof. V.K. Kedrinskii (Russia) Prof. B. Sturtevant (USA)

Short summary of scientific progress achieved

The "IUTAM-Symposium on Waves in liquid/gas and liquid/vapor two-phase system" was held in Kyoto, Japan, 9-13 May 1994. 63 Scientists participated and 42 invited lectures were presented. The topics in the symposium may be classified as (1) waves in liquid-bubble systems including interfacial effects, (2) waves in gas-droplet system, (3) waves in film or stratified systems, (4) waves with liquid-vapor transition, (5) waves with vapor-liquid transition, (6) wave propagation near critical point, and (7) waves with low pressure effect. The superscripts denote the number of contributed papers. Of course, some lectures may cover several topics.

As for the topics of (1), there is a remarkable progress in relation to the well-posedness of the governing equations of void waves. Experiments, numerical simulations and analytical approaches to waves in bubbly liquids have been discussed, both regarding propagation properties and stability. The importance of hydrodynamic interactions is now well recognized. Their description in terms of potential theory is adequate for the evolution of plane nonlinear waves but not for the prediction of instabilities. Obviously, more of the physics must be incorporated.

The researches of (2) have been developed from statistically homogeneous and rarefied droplets to statistically inhomogeneous and non-rarefied ones. This tendency can be seen in the researches of (1), too. The numerical simulation seems to be the most promising method for this purpose. In this symposium, such numerical methods have been presented, and various new phenomena have been found for collisions between droplet-droplet, droplet-liquid layer, and droplet-solid wall.

As for the topics of (3), many lectures have been presented, since the equations describing such waves can be reduced to the Benny's equation, which provides a chaotic solution. It is one of the results in this symposium that this type of equation appears in a variety of flow pattern of two-phase flow.

The problems of (4) and (5) have been developed from one-dimensional equilibrium wave to multi-dimensional non-equilibrium one, associated with non-evolutionarity of the one-dimensional discontinuity analogous to detonation and deflagration waves. On the other hand, many practical problems have been treated and many interesting phenomena have been shown.

As for (6), the problems solved up to date have been arranged principally for a retrograde fluid and the remaining problems have been discussed. The necessity for extending to the multi-dimensional, non-equilibrium problem has been recognized, as in (4) and (5).

Countries represented and number of participants

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Proceedings of the symposium

The Proceedings of this IUTAM-Symposium will be published by Kluwer Academic Publishers in hard cover form about at the end of 1994. The volume will be about 600 pages. The editors are S. Morioka and L. van Wijngaarden.

Financial support

The supporting organizations are listed as follows:
- International Union of Theoretical and Applied Mechanics (IUTAM)
- The Japan Society of Aeronautical and Space Sciences
- The Japan Society of Fluid Mechanics
- Kyoto University, Faculty of Engineering

The financial aids are provided by the following organizations and companies, we appreciate these supports. First of all we acknowledge with thanks the travel grants provided by the International Union of Theoretical and Applied Mechanics. Further contributions are given by:
- Daihatsu Motor Co. Ltd.
- Hitachi Ltd.
- Kansai Electric Power Co. Inc.
- Kawasaki Heavy Industries Ltd.
- Mitsubishi Electric Corp.
- Mitsubishi Heavy Industries Ltd.
- Toyota Motor Corp.

Very helpful financial support for the Symposium was provided by Japan World Exposition Commemorative Association. We are grateful to Japan World Exposition Commemorative Association for this fund.
SCIENTIFIC PROGRAM

9-1
A. Biesheuvel: Structure and stability of void waves in bubbly flows

9-2
S. Moriya: Behavior of void wave on the basis of turbulent liquid-bubbles two-phase flow model

9-3
P.C. Duineveld: Bouncing and coalescence of two bubbles in water

9-4
J. Fabre: Void and pressure waves in slug flow

9-5
B.G. Pokusaev, N.A. Pribaturin, E.S. Vasserman & S.I. Leshnin: Pressure waves in two-phase bubble/slug flows and interphase process

9-6
H. Takahira & T. Akamatsu: Surface oscillations of mutually-interacting gas bubbles in a sound field

9-7
K. Yamada & K. Takayama: Interaction of an underwater shock wave with a gas bubble

9-8
M. Brouillette, D.L. Frost, A.N. Meidani & B. Bruckert: Dynamics of a single exploding gas bubble immersed in a liquid

10-1
N.A. Gumerov: On the waves of the self-induced acoustic transparency in mixtures of a liquid and vapor bubbles

10-2
Y. Matsumoto & M. Kameda: Structure of shock waves in a liquid containing gas bubbles

10-3
M. Watanabe & A. Prosperetti: Pressure waves in bubbly liquids

10-4
A.E. Beylich: Pressure waves in bubbly liquids

10-5
D.G. Crighton & P. Sionoid: High-frequency nonlinear waves in bubbly liquid

10-6
V.P. Skripov & V.N. Skokov: Stability and nonequilibrium phase transitions in boiling-up systems

10-7
A. Prosperetti & M. Watanabe: Acoustic waves in bubbly liquids

10-8
V.M. Teshukov: On the perturbations of evaporation waves and liquefaction shocks

10-9
R. Barbone & D.L. Frost: Explosive boiling and depressurization following depressurization of a volatile liquid

10-10
Y. Kobayashi & T. Watanabe: Film condensation of the vapor flow behind a shock wave on the shock-tube side wall

10-11
S. Fujikawa: Experiments of vapor-liquid phase transition in a shock-tube

10-12
C.F. Delale & G.H. Schnerr: Theoretical investigation of condensation dynamics in shock tubes

11-1
Y. Onishi & H. Tsuji: Propagation of waves in a vapor-gas mixture due to the evaporation and condensation

11-2
K. Aoki, T. Doi & Y. Sone: Unsteady evaporation from a plane condensed phase into a non-condensable gas

11-3
H. Sugimoto & Y. Sone: Evaporation from a cylindrical condensed phase into a vacuum

11-4
R.I. Nigmatulin: Waves in dispersed liquid-gas and liquid-vapor flows

11-5
A.A. Gubaidullin: The peculiarity of propagation of shock waves in bubbly liquids

Excursion

12-1
T. Kitamura, J.H.S. Lee & K. Takayama: Experimental study of fragmentation of molten copper oxide injected into water

12-2
H.M. Mader, J.C. Phillips, R.S.J. Sparks & B. Sturtevant: Observations of explosive exsolution in liquids

12-3
S. Zaleski & G. Zanetti: Direct simulation droplet-droplet collisions, merger and breakup

12-4
M. Rein: Wave phenomena during droplet impact

12-5
G.E.A. Meier: On kinematic waves in two-phase systems

12-6
G.H. Schnerr, St. Adam & G. Mundinger: New modes of periodic shock formation in compressible two-phase flow

12-7
A. Klouwick: Adiabatic waves in the neighbourhood of the critical point

12-8
H. Guin: Material waves for fluid interfaces in the vicinity of the critical point
S.L. Gavrilyuk: A model of a plug-chain system near the thermodynamic critical point: connection with the Korteweg theory of capillarity
12-10

V.K. Kedrinskii: Behaviour of liquid at dynamic loading

13-1

M. Rein: Maximum pressures during hypervelocity liquid-liquid impact
13-2

H. Hayakawa & T.S. Komatsu: Nonlinear waves and bubbles in fluidized beds
13-3

R. Miesen: The hydrodynamic stability of a sheared liquid layer: the liquid mode
13-4

T. Kawahara: Chaotic behavior of waves in two-phase systems
13-5

Y. Hagiwara, S. Yamaguchi & K. Suzuki: Interfacial wave structure and its effect on transport phenomena in horizontal wavy/annular two-phase flows
13-6

L. Fore & A.E. Dukler: Entrainment from interfacial waves in upward annular gasliquid flow: a boundary layer model
13-7

13-8

13-9

S.W. Joo: Thermal control of interfacial instabilities in multilayer thin-film flows
13-10

T. Koshinaka, R. van der Woude & S. Morioka: Pressure wave propagation in a separated liquid-gas layer in a horizontal duct
13-11

Scientific Committee: Panel discussion on “Waves in liquid/gas and liquid/vapor two-phase systems”

S. Morioka
Proceedings of the Symposium


Financial Support

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM). Further support was obtained from the Universität Hannover, the International Science Foundation (ISF), and the Hannoversche Hochschulgemeinschaft.

SCIENTIFIC PROGRAM

Session 1:
Chairperson: P.G. Saffman
E. van Groesen: Poisson perturbation methods for coherent structures
G. Iooss: Gravity-capillary solitary waves as a dynamical reversible system
F. Busse: Traveling waves and standing oscillations in problems of thermal convection

Session 2:
Chairperson: D.H. Peregrine
G. Schneider: Justification of modulation equations in domains with $\pi \geq 2$ unbounded space directions
G. Dangelmayr: Dynamics of confined waves in extended systems
U. Ehrenstein, W. Koch: Local dynamics near a nonsemisimple 1:1 resonance in Blasius boundary-layer flow
M. Groves: A unified treatment of Hamiltonian and Lagrangian formulations for steady water waves

Session 3:
Chairperson: T.J. Bridges
F. Dias: Study of the singularity associated with the minimum of the dispersion curve for capillary-gravity interfacial waves
C. Kharif: Instabilities of finite-amplitude short-crested free surface waves
E. Lombardi: Exponentially small estimate of oscillations for generalized solitary waves
R. Grimshaw: Solitary waves with oscillatory tails

Session 4:
Chairperson: G. Iooss
J.T. Beale: The linearized motion of water waves with application to the analysis of numerical methods

Session 5:
Chairperson: H. Mitsuyasu
D.H. Peregrine: The impact of water waves upon a wall
J.P. Gollub: Averaging and statistics of chaotic wave patterns
H.E. de Swart: Excitation of edge waves and steady currents near partially reflective beaches

Session 6:
Chairperson: G. Dangelmayr
A. Doelman: Homoclinic explosions and implosions
A.J. Roberts: Equations for turbulent flood waves
I. Aranson: Drift of spiral waves in excitable media

Session 7:
Chairperson: M. Weinstein
E.F.G. van Duijnen: PC-Computations of water waves: low-profile, yet high accuracy
Y. Matsumoto: Phase shift of interacting algebraic solitary waves in a two-layer fluid system
E. Soewono: Hopf bifurcation in the dynamical modes of a perturbed Korteweg-de Vries equation

Session 8:
Chairperson: B. Nicolaenko
R. Grauer: Estimates of structure-functions in turbulent two-dimensional magneto-hydrodynamic flows
A. Al-fandikov: Bifurcations of the Poiseuille flow between parallel plates: three-dimensional solutions with large spanwise wavelength
P. Bollermann: Validity of the Ginzburg-Landau approximation in Poiseuille flow: A stream function approach
M. Haragus: On the stability of solitary waves and fronts in some parabolic PDEs of higher order
Session 9:
Chairperson: F. Dias
P. Christodoulides: Spatial bifurcations of interfacial waves
S.V. Korsunsky: Nonlinear waves propagation in dispersive systems with coupled modes
X.-N. Chen: Diamond Soliton Structure—Superconductivity of shallow water channel for ships at supercritical speed

Session 10:
Chairperson: J.P. Gollub
H. Mitsuyasu: Nonlinear instability and evolution of water waves without or with wind action
J. Liu: Nonlinear dynamics of wavy film flows

Session 11:
Chairperson: E. van Groesen
H.C. Chang: Solitary wave dynamics on a falling film
R. Pego: Spectral stability of solitary waves for Boussinesq equations
M. Weinstein: Asymptotic stability of nonlinear bound states

Session 12:
Chairperson: A. van Harten
B. Nicolaenko: Nonlinear wave interactions in Kolmogorov flows
B. Malomed: A new type of solitons in coupled KdV equations
L. Morland: Resonant triads of capillary-gravity waves in the presence of a wind-drift current

Session 13:
Chairperson: R. Grimshaw
M. Lücke: Spatially extended and localized traveling wave convection in binary fluid mixtures
E. Kartashova: Nonlinear wavesystems with elements of integrability
J. Engelbrecht: Spectral analysis of soliton formation

Session 14:
Chairperson: K. Kirchgässner
J.-P. Eckmann: Space-time behavior in problems of hydrodynamic type
T. Gallay: Existence and stability of fronts for the Ginzburg-Landau equation
A. van Harten: Modulated Modulation Equations

K. Kirchgässner, A. Mielke

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

94-4

IUTAM Symposium on Microstructure-Property Interactions in Composite Materials, 23-25 August 1994, Aalborg, Denmark

Scientific Committee

E.C. Atifantis (Greece) S. Murakami (Japan)
B.A. Boley (USA) Ex officio S. Nemat-Nasser (USA)
J.L. Chermant (France) M.R. Piggott (Canada)
G.J. Dvorak (USA) R. Pyrz (Denmark) Chairman
K. Friedrich (Germany) K.L. Reifsnider (USA)
Z. Hashin (Israel) V. Tamuzs (Latvia)
K.P. Herrmann (Germany) V. Tvergaard (Denmark)
Z. Mróz (Poland) J.R. Willis (UK)
A. Needleman (USA)

Short summary of scientific progress achieved

The Symposium brought together researchers from a broad range of backgrounds relevant to the topic of the meeting. The participants represented the disciplines of materials science and engineering, applied mechanics, applied mathematics and scientific computation. The Symposium comprehensively addressed the analytical, numerical and experimental methods that provide an estimation of the overall, effective properties from microstructural data. The 41 contributions emphasized the significance of microstructure morphology in understanding the nature and origin of a multitude of properties such as viscoelasticity, plasticity, strength and fracture for a variety of polymer, metal and ceramic based composite materials. Specifically, the Symposium examined and reviewed the current state of the art of micromechanical modeling, experimental investigations and morphological quantification of composite materials' microstructure.

Countries represented and number of participants

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Proceedings of the Symposium

Financial support

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM). Additional grants were provided by Det Obelske Familiefond and the Institute of Mechanical Engineering, Aalborg University.

SCIENTIFIC PROGRAM

Session 1: Effective Properties 1
Chairman: Z. Mrdž
S. Nemat-Nasser and M. Hori: Bounds for overall elastic properties of heterogeneous solids
M. Hori, Japan: Analytical estimate of interaction among ellipsoidal microconstituents: upper and lower bounds for strain energy due to interaction
M. Arminjon, A. Bottero, B. Guessab and S. Turgeman: Integration of microstructural data into a variational model for random composites
G.J. Dvorak: Transformation analysis of inelastic and damaged solids

Session 2: Distribution Effects 1
Chairman: Z. Hashin
M.R. Piggott: Recent work on mesostructures and mesomechanics in fibre composites
R.M. McMeeking: The influence of reinforcement arrangement on the creep and yielding behavior of metal matrix composites
P. Kim, S. Toll and J.-A. Måson: Micromechanical analysis of the viscoelastic behavior of composites

Session 3: Distribution Effects 2
Chairman: K.P. Herrmann
V. Tvergaard: Reinforcement distribution effects on failure in particulate reinforced metals
H.J. Böhm and F.G. Rammerstorfer: Fibre arrangement effects on the microscale stresses of continuously reinforced unidirectional MMC
M.S. Axelsen and R. Pyrz: Correlation between fracture toughness and the microstructure morphology in transversely loaded unidirectional composites
V. Petrova: Interaction between a main crack and inclusions at shear stress state
D. Kujawski, Z. Xia and F. Ellyin: Morphology/loading direction coupling on the transversal behaviour of composites

Session 4: Effective Properties 2
Chairman: K.L. Reifsnider
B.L. Karikaloo and J. Wang: Effective moduli of concentrated particulate solids
P. Ponte-Castañeda and M. Zaidman: Microstructure evolution in rigid/plastic composites
Cz. Wozniak: On the micromodelling of dynamic response for elastic periodic composites

Session 5: Specific Microstructures
Chairman: S. Nemat-Nasser
A. Needleman and S. Suresh: Microstructural design of metal-matrix composites
V. Klinkmüller, L. Ye, J. Kästel and K. Friedrich: On impregnation quality and resulting mechanical properties of compression moulded thermoplastic powder and commingled yarn based continuous fiber composites
N. Claussen, H. Prielipp, M. Knechtel and J. Rödel: Correlation between geometrical parameters of metal ligaments and mechanical properties of metal-reinforced ceramics
N.A. Fleck: Development of anisotropy in powder compaction
N. Yu: Micromechanical modeling of coupled electro-thermo-mechanical properties of two-phase piezoelectric composites

Session 6: Failure & Fracture 1
Chairman: G.J. Dvorak
Z. Hashin: Cracked laminates with imperfect interlaminar interface
K.P. Herrmann and F. Ferber: Numerical modelling of crack growth in material models of fibrous composites
I. Kimpara and T. Ozaki: Construction of a stochastic macro-failure model of unidirectional fiber reinforced composites based on dynamic failure process simulations of micro-failure models

Session 7: Failure & Fracture 2
Chairman: S. Murakami
V.P. Tamuzs: Multiply cracking of brittle laminates
J. Botsis, C. Beldica and D. Zhao: Crack growth characteristics in a composite with well aligned long fibers
O.B. Naimik: Failure of the high-strength composites as topological transitions in system of microstructural imperfections
B. Bochenek, and R. Pyrz: Discrete model of fracture in disordered two-phase materials

Session 8: Morphological Analysis 1
Chairman: A. Needleman
M. Avellaneda and G.W. Milton: Reduced correlation functions for describing composite microstructure
A. Zaoui, Y. Rougier and C. Stolz: Micromechanical modelling based on morphological analysis: application to viscoelasticity
S. Torquato: Unified methodology to quantify the microstructure and properties of composite materials
M.F. Thorpe, J. Chen, B. Djordjevic, I. Hetherington and I.M. Jasiuk: Properties of two-dimensional materials containing inclusions of various...
shapes

Session 9: Microstructure Degradation
Chairman: K. Friedrich
K.F. Reifsnider and M. Pastor: Evolution concepts for microstructure-property interactions in composite systems
Z. Mróz and S. Stupkiewicz: Hysteretic effects and progressive delamination at composite interfaces
G. Praveen and J.N. Reddy: Stiffness reduction in composite laminates due to transverse matrix cracks
S. Murakami, Y. Kanagawa and T. Ishida: Observation of internal damage and inelastic deformation of graphite/epoxy laminate under cyclic tension-compression
A. Plumtree, G. Shen and G. Glinka: Off-axis fatigue life prediction using microstess analysis

Session 10: Interphase & Interface Effects
Chairman: M.R. Piggott
G.P. Carman: Optimizing the strength of a composite material through the use of fiber coatings; experimental and theoretical evidence

Session 11: Morphological Analysis 2
Chairman: V. Tvergaard
H. Moulinec, J.C. Michel and P. Suquet: A FFT-based numerical method for computing the mechanical properties of composites from images of their microstructure
A.R. Clarke, N. Davidson and G. Archenhold: The measurement and modelling of fibre directions in composites
A.R. Boccaccini and G. Ondracek: The quantitative microstructure-property correlations of composite and porous materials; an engineering tool for designing new materials
T. Siegmund, E.A. Werner and F.D. Fischer: Stereological characterization and finite element modelling of plastic flow in a dual phase (duplex) steel

R. Pyrz

94-5


Scientific Committee
D.F. Parker (UK), Co-Chairman
J.P. Boehler (France)
P. Haupt (Germany)
S. Nemat-Nasser (USA)
A.P.S. Selvadurai (Canada)
H.K. Zorski (Poland)
A.H. England (UK), Co-Chairman
P. Germain (France)
M.A. Hayes (Eire)
A.C. Pipkin (USA)
Y. Tomita (Japan)

Short summary of scientific progress achieved

The aim of the Symposium was to investigate the application of the linear and nonlinear theories of solid mechanics to anisotropic materials, inhomogeneous materials, composite materials, fibre-reinforced and laminated materials, to report on progress in numerical schemes developed from such models and to compare predictions with experimental results. In accordance with this aim, the six invited principal lectures were on the topics of crystal plasticity, granular materials, the ideal theory of fibre-reinforced composites, the dynamics of anisotropic solids, the fracturing of anisotropic solids and the optimization of testing of anisotropic materials. The Symposium had 101 participants from 20 countries who contributed a total of 55 session lectures and 12 posters. The main fields of research covered by these contributions were plasticity and crystal plasticity (12); static and dynamic problems for anisotropic materials (21); composite and laminated materials and idealized fibre-reinforced materials (15); heterogeneous and granular materials, micromechanics and fracture (7); viscoelasticity and creep (4); surface effects in materials (3) together with several papers on material modeling, liquid crystals and integrity bases. Frank and friendly exchanges of ideas took place in the lecture sessions, refreshment breaks and afterwards at the Hall of Residence. Participants remarked on how useful the Symposium had been in putting them in contact with recent developments and with research workers from other countries. Scientifically and socially the Symposium was judged to be very successful.

Countries represented and number of participants

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Proceedings of the Symposium


Financial support

Financial support for the Symposium was generously provided by the following organizations: International Union of Theoretical and Applied
Mechanics (IUTAM); International Science Foundation; The British Council; The University of Nottingham; The City of Nottingham. We are pleased to acknowledge this support.

SCIENTIFIC PROGRAM

Principal lectures

A. Bertram: Description of Finite Plastic Deformations in Single Crystals by Material Isomorphisms
Chairman: H.K. Zorski
J.M. Hill: Granular Materials: Dynamic Modelling and Double-Shearing Theory
Chairman: J.R. Willis
M. Kurashige: An Application of the IFRM Theory to the Evaluation of Interlaminar Shear Stresses in a Fibre-Reinforced Laminate
Chairman: A.C. Pipkin
J.D. Achenbach: The Displacement of Field in General Anisotropic Solids
Chairman: M.A. Hayes
S. Nemat-Nasser: Fracturing in Anisotropic Solids
Chairman: A.P.S. Selvadurai
J.P. Boehler: Optimisation of Direct Biaxial Testing of Anisotropic Materials
Chairman: A.J.M. Spencer

Session lectures

Chairmen: G.J. Dvorak and S. Nemat-Nasser
D. Harris: Kinematic Equations in Plasticity Models for Anisotropic and Inhomogeneous Materials
R.W. Ogden: On the Stability of Shear Bands
P. Perverza: Analysis of the Influence of Anisotropy Effects on Adiabatic Shear Band Localisation Phenomena
G.P. Parry: Decomposition Theorems for Elastic-Plastic Deformations
W. Gambin: Modelling of Textured Materials
A.A. Kirillov Jr. and E.T. Onat: Bounds for the Effective Yield Surface of Polycrystals

Chairmen: E.T. Onat and S.C. Cowin
P. Ponte Castells and M. Zaidman: Effective Yield Surfaces for Anisotropic Composites
B. Svendsen & K. Hutter: A Continuum Model for Deformation of Stress-Induced Anisotropy
A.C. Pipkin: Relaxed Energy Densities for Anisotropic Membranes
Q.-S. Zheng: On the Roles of Initial and Induced Anisotropies

Chairmen: G.A. Maugin and J.L. Bassani
D.I. Milosavljevic: Dynamic Behaviour of Fibre-Reinforced Circular Cylinders & Shells
A.N. Podlipensky: Wave Propagation in Periodically Layered Elastic & Electrostatic Media
V.N. Nikolaevskiy: Nonlinear Waves in Soils and Rocks
D.L. Clements: Surface Motion of Anisotropic & Inhomogeneous Alluvial Valleys under Incident Plane SH-Waves
Ph. Boulanger and M.A. Hayes: Inhomogeneous Plane Waves in Anisotropic Elastic Materials
V.G. Mozhaev: Some New Ideas in the Theory of Surface Acoustic Waves in Anisotropic Media
D.F. Parker and P.J. Sammon: Nonlinear Surface Waves Travelling over a Corrugated Elastic Half Space

Chairmen: R.M. Christensen and A.J.M. Spencer
G.J. Dvorak and J.R. Zaikov: On the Effective Properties of Gradient Composite Materials
D.S. Talbot and J.R. Willis: Upper and Lower Bounds for the Overall Properties of a Nonlinear Elastic Composite
E. Hervé and A. Zaoui: Morphological Representative n-Layered Cylindrical Pattern-Based Micromechanical Modelling
J.T. Evans: The Deformation of Ideal Fibre-Reinforced Materials and Real Composites
R.S. Rivlin: Plane Stress in Fibre-Reinforced Composites
P. Watson: Squeezing Flow of Fibre-Reinforced Viscoelastic Composites

Chairmen: P. Perzyka and R.J. Knops
J. Betten and W. Helisch: Integrity Bases for a Fourth-Rank Tensor
S.C. Cowin and M.M. Mehrabadi: A Development of the Anisotropic Elastic Symmetries using only Mirror Symmetry Operations
R.M. Christensen: Low Density, heterogeneous Material Mechanics
J.N. Flavin: Qualitative Estimates for a Laminate-like Elastic Material
T.C.T. Ting: The Image Singularities of Green's Functions for an Anisotropic Elliptic Inclusion under Antiplane Deformations
Y.K. Liang, C. Hwu and W.J. Yen: Interactions between Cracks and Inclusions

Chairmen: M.F. McCarthy and R.W. Ogden
P.S. Symonds: Aspects of Chaotic Response of an Elastic-Plastic Beam to Impulsive Loading
J.L. Bassani: Localised Interface Waves and Phonons
G.A. Maugin and C. Trimarco: Configurational Forces and Coherent Phase-
Transition Fronts in Thermoelastic Solids
Y. Fu: Linear and Nonlinear Instability of the Steady Post-Buckling State
Associated with a Pre-stressed Elastic Plate

Chairmen: J.P. Boehler and J.D. Achenbach
A. Galka and B. Gambin: Boundary Layer Effects in Piezoelectric
Composites
Q.-C. He and A. Curnier: A Theorem on Elasticity Tensors and its
Application to Continuum Damage Mechanics
D. Delafose and L.P. Kubin: Effect of Dynamic Strain Ageing and
Portevin-le-Chatelier Instabilities on the Tearing Failure of 2091 Al-Li
Sheets
A.P.S. Selvadurai: Micro-Mechanics of a Segmented Embedded Fibre
Y.J. Weitsman and H. Zhu: The Progression of Failure Mechanisms in
Unidirectionally Reinforced Ceramic Composites
T. Sadowski: Modelling of Semi-Brittle Ceramic Behaviour under a Quasi-
Static Deformation Process
M. Hori: Analysis of Anomaly Microcrack Growth in Solids Prior to
Compression Failure

Chairmen: A. Bertram and Y. Tomita
J. Sweeney and I.M. Ward: Rate-Dependent and Network Phenomena in the
Multiaxial Drawing of PVC
Y. Tomita: Dynamic Flow Localisation in Plane-Strain Blocks Obeying a
Thermo-Elasto-Viscoplastic Constitutive Equation
C. Sansour: Induced Anisotropy at the Actual Configuration and the
Adequate Formulation of a Free Energy Function
F.M. Leslie and S.P.A. Gill: Continuum Theory for Certain Smectic Liquid
Crystals
K.S. Havner: An Analytical Investigation of Inhomogeneous Straining,
Subgrain Formation, and the Initiation of Microshear Bands in Bicrystals
J. Rychlewski: Anisotropy and Proper States of Materials
A. Zolochevsky: The Formulation of Constitutive Equations for Anisotropic
Materials with Different Behaviour in Tension and Compression

Chairmen: P.S. Symonds and G. Eason
G.A. Rogerson: Waves in Pre-Stressed Elastic Laminates
S. Imatani, T. Saito and K. Yamaguchi: Out-of-Plane Deformation in
Laminated Sheet Metals
K.P. Soldatos and J.Q. Ye: Three-Dimensional Static, Dynamic and
Thermoelastic Analysis of Homogeneous and Laminated Composite
Cylinders
W.A. Green: 1-D Discrete and Continuum Models of Nanolayered
Structures
Y. Sibutani, V. Vitek and J.L. Bassani: Local Atomic Level Elastic Moduli
of Surface Regions

Poster Sessions
C. Alessandri and A. Tralli: Effects of Inclusion Shape on the Overall
Behaviour of Fibre-Reinforced Composites with Interphase Unilateral
Constraints
J. Awrejcewicz and J. Mrozowski: Nonlinear Dynamics of a Rectangular
Plate
D. Breslavsky and O. Morachkovsky: New Model of Nonlinear Dynamic
Creep
H.W. Chandler: On the Volume of Changes of Granular Materials and their
Consequence for Plastic Theory
R. Craster: On Herschel-Bulkley Flows
M. Elzanowski: Higher Grade Material Structures, Elastic-Energy-
Momentum Tensor, Gauge-Invariance
D. Gross and I. Schmidt: A Strategy for Determining the Equilibrium Shape
of Inclusions
S. Hazanov, M. Amieur and C. Huet: Numerical and Experimental
Assessment of the Size and Boundary Conditions Effect for the Overall
Properties of Granular Composites Below the Representative Volume
F. Hild and D. Marquis: Influence of Sub-Critical Propagation of Initial
Flaws on the Reliability of Brittle Structures
A. Irving, B.R. Clayton and T. Dewson: Nonlinear Thermoviscoelastic
Behaviour in Complex Materials
A. Morro and G. Caviglia: Waves in Dissipative Anisotropic Solids
I.V. Simonov: 2-D Asymptotic Theory for Dynamics of Thin Highly
Inhomogeneous Asymmetric Laminates

D.F. Parker & A.H. England

94–6

IUTAM Symposium on Laminar - Turbulent Transition: 5 - 9 September
1994, Sendai, Japan.

Scientific Committee
R. Kobayashi (Japan), Chairman
H. Alfredsson (Sweden)
D. Amal (France)
H. Bipes (Germany)
M. Gaster (UK)
V. Ya. Levenenho (Russia)
R. Narasimha (India)
M. Nishioha (Japan)
E. Reshotko (USA)
W.S. Saric (USA)
T. Tatsumi (Japan) ex officio
H. Zhou (China)

Short summary of scientific progress achieved

Two keynote lectures have critically reviewed recent development of
researches concerning the laminar-to-turbulent transition phenomena from
the fundamental and the application aspects. Many papers presented were
concerned about the detailed mechanism of the boundary layer transition (receptivity, secondary instability, turbulent spot and bypass transition). Particular emphasis was further placed on the transition of three-dimensional boundary layers on rotating systems and on swept wings. Attention was also given to compressible hypersonic flows. Poster sessions after three minutes introduction for each paper induced hot discussions.

Countries represented and number of participants

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Proceedings of the Symposium

The Proceedings will be edited by R. Kobayashi and published by Springer-Verlag by March of 1995.

Financial support

The financial support was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM), the Japanese Ministry of Education, Science and Culture, the Japan Society of the Promotion of Science and the Japan International Exhibitions Memorial Society. In addition, the International Science Foundation provided travel support for two Russian scientists.

Scientific Program

Keynote Lectures

Chairman: T. Tatsumi
D. Arnaud: A Survey of the Transition Prediction Methods: from Analytical Criteria to PSE and DNS
Chairman: E. Reshotko
M. Nishioaka: Some Fundamental Problems on Transition to Wall Turbulence

Session A: Fundamentals I
Chairman: H. Bippes
M.T. Landahl: Role of Non-Wave-Like Disturbances in Transition
X. Wu and P.A. Stewart: Interaction of Phase-Locked Modes: A New

Mechanism for the Rapid Growth of Three-Dimensional Disturbances
A.D.D. Cralk: Stability of Two- and Three-Dimensional Time-Dependent Flows with Locally-Uniform Strain Rates

Session B: Fundamentals II
Chairman: H. Zhou
S. Masuda, D. Hori and M. Matubara: Secondary Instability Associated with Streamwise Vortices in a Rotating Boundary Layer
C. Airiau and G. Casalis: Non Linear PSE Compared with DNS and Experiment

Session C: Fundamentals III
Chairman: M. Malik
K. Tanaka, H. Saito and H. Sato: Fine Structure of the 3-Dimensional Transition Region in the Wake Behind a Thin-Shell Cylinder Placed Parallel to a Uniform Flow
A.A. Draad, G.D.C. Kuiken and F.T.M. Nieuwstadt: Transition to Turbulence in Pipe Flow
M. Asai and M. Nishioaka: Subcritical Disturbance Growth Caused by Hairpin Eddies

Session D: Flow Measurement and Controls
Chairman: H.G. Hornung
J. Suttan, M. Baumann and W. Nitsche: In-Flight Measurements on a Laminar Wing Glove by Means of Surface Sensor Arrays
S.V. Manuilovich: Laminarization of Three-Dimensional Compressible Boundary-Layer Flow Using Receptivity Control
D.I.A. Poll and M. Danks: Relaminarisation of the Swept Wing Attachment-Line by Surface Suction

Session E: Compressible Flows
Chairman: R. Narasimha
H.G. Hornung and P. Germain: An Exploratory Study of Transition on a Slender Cone in Hypervelocity Flow

Session F: Poster Session I (Fundamentals, Controls, Compressible Flows and Turbulent Spots)
Chairman: W. S. Saric
M. Arakawa and Y. Matunobu: Turbulence in Pulsatile Flow Through the Tube with Elastic Wall
J.C. Juilen and D. Arnaud: Experimental Study of Boundary Layer Suction
Effects on Leading Edge Contamination Along the Attachment Line of a Swept Wing
V.A. Kazakov: Analysis of the Formation of a Turbulent Spot in a Laminar Boundary Layer
E. Kufner: Entropy- and Boundary Layer Instability of Hyper sonic Cone Flows - Effects of Mean Flow Variations -
F. Li and M.R. Malik: Mathematical Nature of Parabolized Stability Equations
V.I. Lysenko: High-Speed Boundary-Layer Stability and Transition
H. Maekawa, H. Takami and T. Nishioha: "Vortex Dynamics" of a Vortex Ring Introduced into a Laminar Boundary Layer
M. Matsubara and P.H. Alfredsson: Experiments on Secondary Instability of Channel Flow with Body Forces
K. Yamamoto: Numerical Simulation on Laminar-Turbulent Transition of the Channel Flow with Simulated Wall Roughness

Session G: Bypass Transitions, Turbulent Spots
Chairman: D.I.A. Poll
B.F.A. van Hest, D.M. Passchier and J.L. van Ingen: The Development of a Turbulent Spot in an Adverse Pressure Gradient Boundary Layer
D.S. Henningsson, S. Berlin and A. Lundbladh: Spatial Simulations of Bypass Transition in a Boundary Layers
F.N. Shaikh and M. Gaster: The Natural Evolution of Turbulent Spots in a Flat Plate Laminar Boundary Layer
M. Jahnmiri, A. Prabhu and R. Narasimha: Turbulent Spot in 3-D Constant Pressure Flow

Session H: Swept Wings
Chairman: P. H. Alfredsson
A.V. Boiko, V.V. Kozlov, V.V. Syzrantsev and V.A. Scherbakov: Experimental Study of Secondary Instability and Breakdown in a Swept Wing Boundary Layer
R.H. Radecky Jr., M.S. Reibert and W.S. Saric: Development of Stationary Crossflow Vortices on a Swept Wing

Session I: 3-D Boundary-Layers I
Chairman: H. Fasel
T. Azuma: An Experiment on Transition of Three-Dimensional Boundary Layer
H. Bippes: Instabilities Developing in the Three-Dimensional Boundary Layer on Concave and Convex Curved Surface
N. Itoh: Effects of Wall and Streamline Curvatures on Instability of 3-D Boundary Layers

Session J: Poster Session II (Swept Wings, 3-D Boundary Layers, 2-D Boundary Layers and Receptivity)
Chairman: H. Sato
E.S. Asmolov, S.V. Manuilovich: Stability of Two-Phase Boundary Layer on a Flat Plate
A.A. Bakhinov, K.J.A. Westin, V.V. Kozlov and P.H. Alfredsson: On the Receptivity of a Flat Plate Boundary Layer to Localized Free Stream Disturbances
P.W. Hammerton and M. Gaster: Comparison of Asymptotic Prediction Methods for Boundary-Layer Receptivity
E.S. Holm and V.S. Kosorygin: On Excitation of Unstable Boundary Layer Waves by Freestream Sound
M.J. Jennings, P.A. Stewart and X. Wu: Resonant-Triad Interaction in Boundary-Layer Transition
V.R. Gaponenko, A.V. Ivanov and Y.S. Kachanov: Experimental Study of Cross Flow Instability of a Swept-Wing Boundary Layer with Respect to Traveling Waves
A. Hanifi and A. Dahikild: Stability Characteristics of 3-D Boundary Layer on a Yawed Cone
R.J. Lingwood: Absolute Instability of the Rotating-Disk Boundary Layer
W. Mueller, H. Bestek and H. Fasel: Spatial Direct Numerical Simulation of Transition in a Three-Dimensional Boundary Layer
U. Rist and Y.S. Kachanov: Numerical and Experimental Investigation of the K-Regime of Boundary-Layer Transition
W.S. Saric, W. Wei and B.K. Rasmussen: Effect of Leading Edge on Sound Receptivity
S. Takagi and N. Itoh: On Similarity Law of the Crossflow Instability in Three-Dimensional Boundary Layers on Yawed Cylinders
J.J. Healey: Comparison Between the Orr-Sommerfeld and Asymptotic Theories for the Flat-Plate Boundary Layer

Session K: 3-D Boundary Layers II
Chairman: V.V. Kozlov
S. Jarre, P. Le Gal and M.P. Chauve: Analysis of the Instability of the Boundary Layer over a Rotating Disk
Y. Kohama, Y. Kodashima and H. Watanabe: Randomization Process in Crossflow Instability Dominant Three-Dimensional Boundary-Layer Transitions

Session L: 2-D Boundary Layers
Chairman: F. Hama
P.A. Elofsson and P.H. Alfredsson: Experiments on Nonlinear Interaction Between Oblique Tollmien-Schlichting Waves
Y.S. Kachanov and A. Michalke: Three-Dimensional Instability of the Blasius Boundary Layer
B.G.B. Klingmann, A.A. Bakchinov, G.R. Grek and V.V. Kozlov: On the Stability of a Boundary Layer with Embedded Streamwise Vortices
M. Kloker and H. Fasel: Direct Numerical Simulation of Boundary-Layer Transition with Strong Adverse Pressure Gradient

Session M: Receptivity I
Chairman: V. Ya. Levchenko
F.P. Bertolotti: A Partial Simulation of Receptivity and Transition in 3-D Boundary Layers
J.D. Crouch: Distributed Excitation of Cross-Flow Vortices in Three-Dimensional Boundary Layers
R. Kobayashi, Y. Fukunishi, T. Nishikawa and T. Kato: The Receptivity of Flat-Plate Boundary-Layers with Two-Dimensional Roughness Elements to Freestream Sound and Its Control

Session N: Receptivity II
Chairman: D. Arnal
V.S. Kosorygin, R.H. Radeztsky Jr. and W.S. Saric: Laminar Boundary-Layer Sound Receptivity and Control
V. Ya. Levchenko: On 3-D Boundary Layer Receptivity

R. Kobayashi

94–7

IUTAM Symposium on Mechanical Problems in Geodynamics, 5-9 September, 1994, Beijing, China

Scientific Committee

Ren Wang (China, Chairman)  A.L. Hales (Australia)
C. Froidevaux (France)  W.R. Peltier (Canada)
D.P. McKenzie (UK)  F. Ziegler (Austria)
A. Vogel (Germany)  D.L. Turcotte (USA)
V.P. Miasnikov (Russia)  S. Uyeda (Japan)
K. Aki (USA)

Short summary of scientific progress achieved

The Symposium provides an extraordinary opportunity for scholars from mechanics, geophysics, seismology, space geodesy and geology to exchange ideas, and promote multidisciplinary research on geodynamics. The Symposium focused on three topics: mantle convection and global geodynamics, continental dynamics, and earthquake mechanics. Western scientists are very much interested in reviews on Chinese, Indian and Russian geodynamics presented at the Symposium. Predictions in geodynamics usually are inverse problems, which have non-unique solutions. People often want their solutions to be compared with reality, but a common problem in geodynamics is: what is the reality? Participants all feel the necessity of multidisciplinary approach to reduce the non-uniqueness in geodynamic inversion. Although computation of mantle convection in 3-D spherical shell with realistic rheology by using super computers is an important advance in geodynamics, many important regional lithospheric dynamic problems can still be solved in standard computers and obtained meaningful results, so scientists from the third world without super computing facilities can still make contributions on many important problems, e.g., decoupling of deformation in lithosphere and asthenosphere and many important geodynamic problems solved in regional scales are reported in talks at the Symposium. Participants also discussed collaboration and exchange of data, in the electronic age, these exchanges are of special importance in geodynamics study.

Countries represented and number of participants

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<th>Country</th>
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* Overseas Chinese scientists

Proceedings of the Symposium

A special volume of PAGEOPH (Pure and Applied Geophysics) will be published as the proceedings of the symposium edited by R. Wang and K. Aki. All papers submitted will go through the regular peer review process. The special volume will also be published as a book.

Financial support

The Symposium organizers recognize the financial support of IUTAM of US$ 7,500 (IUTAM grants were partially reimbursed, US$ 4,200 were taken from ICSU travel grants given to IUTAM. The support by ICSU is especially acknowledged). Names of recipients are in the files of the IUTAM Treasurer. The Symposium organizers recognize the additional financial support of: International Association of Seismology and Physics of the Earth's Interior (IASPEI), the National Natural Science Foundation of China (NSFSC), the Geophysical Society of China, the Chinese Seismological Society, Chinese Society of Theoretical and Applied Mechanics and Joint Seismology Foundation.
Variations on the Perturbations to the Moment of Inertia Tensor
Benjamin Fong Chao and Richard S. Gross: Coseismic Effects on the Earth's Rotation and Gravitational Field and Their Energy Consideration
Kevin D. Pang, Kevin K.C. Yau, Hung-Hsiang Chou and John A. Bangert:
The Earth's Paleorotation and Postglacial Rebound Rates, as Deduced from Analysis of Ancient Chinese Sunrise and Sunset Eclipse Records

Session 7: Mantle Convection and Global Geodynamics VI
Chairman: S. Tsuibo, TENG J.W.
V.P. Miasnikov: Fundamental General Relationships for a Model of an Elastic Heterogeneous Resistant Medium. Geodynamical Examples
FENG Deyi, NIE Yongan, WU Guoyou, CHEN Huanan, and GUO Ruizhi:
Wavelike Phenomena in Geodynamic Process and Their Applications in Earthquake Research
Rabindra Kumar Bhattacharyya: On Reflection of Waves from the Boundary of a Random Elastic Semi-Infinite Medium

Session 8: Earthquake Mechanics I
Chairman: F.H. Cornet, FENG D.Y.
Keiti Aki: Interrelation Between Fault Zone Structures and Earthquake Processes
WANG Kelin: Importance of Aseismic Slip in Subduction Processes
CHEN Yuntai, ZHAO M. and LI X.: Source Process of the 1990 Gonghe, China, Earthquake and Tectonic Stress Field in the Northeastern Qinghai-Xizang Plateau

Session 9: Earthquake Mechanics II
Chairman: R. Dmowska, CHEN Y.
YIN Xiangchu, CHEN Xuezhong, SONG Zhiping and YIN Can: The Load-Unload Response Ratio Theory - A New Approach to Earthquake Prediction
YIN Z.-M and G.C. Rogers: Co-Seismic Displacement and Stress Fields due to Strike-Slip Faulting with Nonuniform Slip and Their Effects on the Change of Tectonic Stress Field
F.H. Cornet, YIN Jianmin and O. Scotti: Toward a physical understanding of earthquake scaling relations
ZHENG Tianyu, YAO Zhenxing: Full Seismic Moment Tensor of the Taiwan Earthquake and Its Tectonic Significance
CHEN Xiaofei, Keiti Aki: An Effective Method to Invert the Dynamic Seismic Source Parameters

Session 10: Continental Geodynamics I
Chairman: P. Hudleston, ZHANG S.X.
ZENG Rongsheng, GU Xuejin and ZHANG Dongning: Dynamics of the Extensional Basin
Sherman Semyon I.: Faulting in Extensional Zones of the Lithosphere: Comparison of Quantitative Natural and Experimental Data
LIU Min: Crustal Shortening and Extension: Dynamic Links and the Implications for Tectonic Evolution in the North American Cordillera
SHI Yaolin, Rick Allis and Fred Davey: Thermotectonic Modeling of the Southern Alps, New Zealand

Session 11: Continental Geodynamics II
Chairman: T.N. Gowd, DING Zhong-yi
Wolf R. Jacoby: On the Mutual Roles of Plate Divergence and Magma Accumulation in the Triggering of Rifting Episodes
WANG Lianjie, CUI Junwen, ZHANG Lirong, WU Hongling and WANG Wei: Finite Element Analysis of Tectonic Stress Field in Tibet Plateau
LIU Lanbo, Alan T. Linde, I. Selwyn Sacks and HE Shihai: Modeling the Nucleation-Occurrence Process of the 1989 Datong Earthquake (M6.1) by Discontinuous Deformation Analysis (DDA)

Session 12: Continental Geodynamics III
Chairman: J.P. Vilotte, LI F.Q.
Peter Hudeleston and LAN Labao: Rheological Information from Geological Structures
CAI Yongen, WANG Chi-yuen, HWANG Win-tsuang and Guy R. Cochran: The Effects of Fault-bend Folding on Seismic Velocity in the Marginal Ridge of Accretionary Prisms
YIN J.M. and F.H. Comet: Optimal Determination of Regional Stress Field and Heterogeneous Stress Investigation

Session 13: Poster visit and discussion I
Chairman: K.D. Pang, CHEN P.S.
LI Fangquan: Stress State and Activity of Fault in China Mainland
LAN Labao and Peter Hudeleston: A Method of Estimating the Stress Exponent in the Flow Law in Rocks Using Fold Shape
DING Zhongyi: Viscoelastic Response of a Layered Half-Space to Surface Loads and Temperature Increments
WANG Yihua: On the Granite Occurrence along a Deep-Seated Thrust Belt in Southwestern Fujian, China
SHI Ge, SHEN Liandi: Experimental Study of Dynamic Mechanical Property under Porosity, Permeability and Saturation Conditions
WU Hongling: The Stress Field Around a Strike Slip Fault and Phenomena of Equal Spacing

Session 14: Earthquake Mechanics III
Chairman: D.A. Lockner, WANG Q.S.
CHEN Yuntao: Review on Seismic Source Studies in China
Renata Dmowska, ZHENG Guotian and James R. Rice: Seismicity and Deformation at Convergent Margins due to Heterogeneous Coupling
James D. Byerlee and David A. Lockner: The Earthquake Instability on

Faults Containing Water in Seal-bounded Compartments

Session 15: Poster visit and discussion II
Jean-Pierre Vilotte: Roughness of Natural Crack Surfaces Characterization and Physical Implications
CHEN Peishan and XIAO Lei: The Stress Pattern in Main Earthquake Zones HE Changrong: Slip-weakening Constitutive Relation and the Structure in Vicinity of a Shear Crack Tip
ZHAO Yonghong, LIANG Haihua, GENG Jinda and WANG Ren: Development of Subcracks Around Compound Fractures in Rock Specimen
GENG Lumin, SHI Yaolin and ZHANG Guoming: The Mechanism of High Pore Pressure Distribution within Fault Zones
Lawrence Hutchings, William Foxall: Lithological and Rheological Constrains on Fault Rupture Scenarios for Ground Motion Hazard Prediction

Session 16: Workshop on further development of geodynamics
Chairman: R. Gordon, ZENG R.S.

Ren Wang

IUTAM Symposium on The Active Control of Vibration, 5-8 September 1994, Bath, UK.

Scientific Committee

J. Angeles (Canada) G. Schweizer (Switzerland)
I.I. Blekhman (Russia) M. Shinozuka (USA)
C.R. Burrows (UK), Chairman R. Stanway (UK)
D.A. Crolla (UK) G.R. Tomlinson (UK)
B.G. Johnson (USA) H. Ulbrich (Germany)
J.E. Mottershead (UK)

Short summary of scientific progress achieved

The developments in many areas of engineering towards higher performance requires the control of vibration. Passive techniques have been in use for many years, but technological advances over the past two decades have made active vibration control an exciting field of research. The main advances relate to actuation, sensors, controller hardware, control strategy design, together with increased understanding of the sources of vibration. In total, 41 papers were commissioned from leading international experts. The Symposium brought together researchers from different disciplines, having the common theme of vibration control. An exchange of ideas and techniques therefore occurred during useful discussion periods. This stimulated future work and established contacts for further collaborative
Investigations.

**Countries represented and number of participants**

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**Proceedings of the Symposium**

The proceedings were published for the Symposium by MEP Ltd., UK (editors: C.R. Burrows and P.S. Keogh).

**Financial support**

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM). This was targeted at those delegates who would otherwise have been unable to attend.

**Scientific Program**

Session 1: **Active Control of Noise & Vibration in Structures I.**
Chairman: J.E. Mottershead
S.J. Elliott, T.J. Sutton, M.J. Brennan and R.J. Pinnington: Vibration Reduction by Active Wave Control in a Strut
A. Suleman and V.B. Venkayya: Formation of a Composite Panel with Piezoelectric Layers for Application to the Flutter Problem
S.S. Rao: Active Control of Vibration Using Fuzzy Game Theory

Session 2: **Active Mechanisms.**
Chairman: J. Angeles
H. Ulbrich, X.-X. Wang and J. Bormann: Design of Actuators for Mechanisms Control
K.S. Cho, J. Angeles and N. Hori: A Robust Model for the Discretization of Flexible Links Based on Cubic Splines

Session 3: **Vibration Control of Flows.**
Chairman: I.I. Blekhman
E.B. Kremer: Control of Gas Content in Bubble Media Vibration
A.S. Ginevsky: Acoustic, Vibrational and Aerodynamical Methods of Turbulent Mixing Control in Subsonic Jets
E.V. Vlasov: Peculiarities of Acoustic Loading of Air Vehicle Structures in the Near Sound Field of a Jet

Session 4: **Vibration Control in Rotating Machinery I.**
Chairman: H. Ulbrich
R. Larsson and R. Herzog: Feedforward Compensation of Unbalance: New Results and Application Experiences
P.S. Keogh, C.R. Burrows and C. Mu: Robust Controller Design for Attenuation of Rotor Vibration

Session 5: **Active Control of Vehicle Vibration.**
Chairman: D.A. Crolla
S. Senthil and S. Narayanan: Optimal Preview Control of a Two D.O.F. Vehicle Model
R. van Cauter, B. Verbeure, W. Dehandschutter and P. Sas: Design of a Selective High Frequency Band LQG/LTR Controller
G. Prokop and R. Sharp: On the Properties of a Preview Controlled Discrete-Time System with use of a State Observer - Application to a Limited-Bandwidth Vehicle Suspension
G.P. Frost, T.J. Gordon and Q.H. Wu: The Application of Learning Automata to Advanced Vehicle Suspension Control
F. Yu and D.A. Crolla: Adaptive Strategies for Active Vehicle Suspension Control

Session 6: **Active Versus Passive Control.**
Chairman: G. Schweitzer
K.J. Rieger and W. Schiehlen: Active versus passive control of vehicle suspensions - hardware in the loop experiments
A.M. Beard, A.H. von Flotow and D.W. Schubert: A practical product implementation of an active/passive vibration isolation system

Session 7: **Active Control of Noise and Vibration in Structures II.**
Chairman: J.E. Mottershead
D.J. Inman: Vibration Suppression via Eigenstructure Assignment and Inverse Methods
J. Swevers, H. Van Brussel, Indrawanto and D. Torfs: Accurate Motion Control of an Overhead Crane
M.P. Cartmell, L. Morrisey and A.J. Taylor: The Dynamics of Spreader Motion in a Mobile Gantry Crane

Session 8: **Interaction Between Modelling and Control.**
Chairman: G. Schweitzer
J. Steidle: Controller Design with Observer for the Control of Elastic Joint Robots
T. Frischgesell, K. Popp, T. Szolc and R. Bogacz: Active Control of Elastic Beam Structures
Session 9: Earthquake Isolation.
Chairman: M. Shinozuka
T. Fujita: Semi-Active Control of Base-Isolated Structures
L. Buckle: Application of Passive Control Systems to the Seismic Retrofit of Historical Buildings in the United States
M.Q. Feng: Innovations in Seismic Isolation

Session 10: Vibration Control in Rotating Machinery II.
Chairman: H. Ulbrich
J. Althaus, P. Stelter and B. Feldkamp: An Active Hydraulic Bearing for a Solid-Bowl Screw Centrifuge
T. Jäger and S. Fürst: Hydraulic Control of Actuators for a High Speed Rotor
I.F. Santos: Design and Evaluation of Two Types of Active Tilting Pad Journal Bearings
V.M. Fridman, H.M. Khutoretski, B.V. Ryjik and V.E. Shkolnik: A Vibration Condition Monitoring System for Large Turbogenerators

Session 11: Active Control Applications.
Chairman: G.R. Tomlinson
J. Wassermann, C. Böchelt and H. Springer: Electromagnetic Impactor (EMI) for Modal Testing of Structures
S. Laugesen: An Example of Power Based Active Control of Vibrations

Session 12: Forces, Actuators and Sensors.
Chairman: R. Stanway and B.G. Johnson
J.A. Rongong, J.R. Wright, G.R. Tomlinson and R.J. Wynne: Modelling of Active Damping for the Extensional Vibrational Behaviour of a Beam
A.R. Johnson, J. Makin and W.A. Bullough: Outlook on the Avoidance and Attenuation of Angular Vibrations/Oscillations by the use of Electro-Rheological Fluids

Session 13: Machine Control.
Chairman: J.I. Blekhman
I.I. Blekhman: Self-Synchronization of Mechanical Vibroexciters: Control of Vibrations, Generalized Rotors Self-Balancing Principle
P.S. Landa: Active Control of Chaotic Vibrations
V.M. Fridman: Nonlinear Problems of Power Machine Dynamics
E.P. Petrov: Analysis and Optimal Control of Stresses Amplitudes upon Forced Vibration of Turbomachine Impellers with Mistuning

C.R. Burrows

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

94-9

IUTAM Symposium on Size-Scale Effects in the Failure Mechanisms of Materials and Structures, 3-7 October 1994, Torino, Italy.

Scientific Committee
A. Carpenteri (Italy), Chairman J. Kasperkiewicz (Poland)
B. Barr (UK) M.P. Luong (France)
Z.P. Bazant (USA) E. Steck (Germany)
B.A. Boley (USA) T. Yokobori (Japan)
M. Elices (Spain) J.G.M. van Mier (The Netherlands)
B.L. Karihaloo (Australia) Y.V. Zaitev (Russia)

Short summary of scientific progress achieved

The central purpose of the Symposium was to investigate into extending material testing results to structural design. It is well-known that the nominal tensile strength of many materials undergoes very clear size effects. The usual trend is that of a strength decrease with size, and this is more evident for disordered materials (e.g., concrete, rocks, ceramics). Griffith (1921) explained the strength size effect in the case of glass filaments, assuming the existence of inherent microcracks of a size proportional to the filament cross-sectional diameter. Some years later Weibull (1939) gave a purely statistical explanation to the same phenomenon according to the weakest-link-in-a-chain concept. Now the two views are harmonized and enriched within the interdisciplinary framework of Fractal Geometry and Renormalization Group Theory. It has been recently observed how the fracture surfaces of many materials present a fractal nature with a roughness producing a dimensional increment with respect to the number 2. Also in this case it is possible to detect an evident mechanical consequence, considering the size effects on fracture energy and/or fracture toughness. Since Hillerborg's proposal for a concrete fracture test was published as RILEM Recommendation (1985), several researchers have measured a fracture energy which increases with specimen size. Such a trend has been systematically found also for other materials and different fracture toughness parameters. Although it has been possible to find a first rationale through Dimensional Analysis by emphasizing a transition from strength to energy collapse when the structural size increases, even in this case the tremendous potentialities of the new Mathematics and Physics are set in focus. Lately it has been experimentally verified that the mechanical behaviour ranges from ductile to brittle when the structural size alone is increased and the material and geometrical shape are kept unchanged. Large components fail owing to rapid crack propagation, when the global behaviour is still linear elastic and the slow crack growth and plastic zones have not yet developed (e.g., the Liberty Ships). On the other hand, small specimens fail in a ductile manner with a slow crack growth. Such a transition is
substantially produced by the difference in the physical dimensions of tensile strength and fracture toughness (or fracture energy). The shape of the load versus displacement response changes substantially according to the variation in the size-scale. The softening branch becomes steeper when the size-scale increases, and a critical size exists, beyond which a cusp catastrophe occurs (snap-back). In some cases, when the material is sufficiently reinforced, even a phenomenon of snap-through may emerge. In this broader context, traditional aspects of fracture mechanics, such as the crack growth resistance curve, for the description of slow and stable crack propagation, crack instability criteria, for the description of fast and uncontrollable crack propagation, and crack arrest criteria, for the evaluation of safety margins, find a rational explanation, as well as the possibility of a real structural application, for metals, concrete, rocks, soils, polymers, ceramics, fibre-reinforced composites, etc.

The Symposium has brought together researchers from different fields of Physics and Engineering and the discussion following the presentations allowed to compare and integrate different views, approaches and methodologies. Fortythree papers were presented in five days. The Symposium provided an excellent opportunity for effective interaction among leading scientists and young researchers, academicians and application oriented individuals.

**Countries represented and number of participants**

- Austria: 4
- Australia: 3
- Belgium: 3
- Canada: 1
- Denmark: 6
- France: 6
- Germany: 6
- Greece: 1
- Hungary: 1
- Italy: 25
- Japan: 5
- Israel: 2
- Poland: 3
- Romania: 1
- Russia: 1
- Spain: 3
- Sweden: 2
- Switzerland: 3
- Netherlands: 7
- UK: 6
- USA: 12
- Total: 99

**Proceedings of the Symposium**

The Proceedings will be edited by Alberto Carpinteri and published by Chapman & Hall - E & FN SPON within the first half of 1995.

**Financial support**

The financial support was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM) of US$ 7,500 (IUTAM grants were partially reimbursed, US$ 4,200 were taken from ICSU travel grants given to IUTAM. The support by ICSU is especially acknowledged).

Names of recipients are in the files of the IUTAM Treasurer. The Symposium organizers recognize the additional financial support of: the Italian National Science Foundation (CNR), and the Politecnico di Torino. The Symposium was co-sponsored by the International Union of Testing and Research Laboratories for Materials and Structures (RILEM), and by the European Structural Integrity Society (ESIS).

**SCIENTIFIC PROGRAM**

**Session 1: Continuum models**
- Chairman: G. Maier
- Alfantis, E.C.: Scale effects in localization and fracture
- Bazant, Z.P. and Yuan-Neng Li: Scaling of cohesive fracture
- de Borst, R. and Carmeliet, J.: Stochastic approaches for damage evolution in standard and non-standard continua
- Huet, C.: A continuum thermodynamics approach for size effects in the failure of concrete type materials and structures
- Ozbolt, J.: Scaling laws in concrete structures

**Session 2: Discrete models**
- Chairman: J.G.M. van Mier
- Eficles, M., Guinea, G.V. and Planas, J.: Prediction of size-effect based on cohesive crack models
- Karihaloo, B.L.: Physical causes for size effect in concrete structures
- Smith, E.: Scaling effects in the fracture of materials
- Ullikjaer, J.P. and Brincker, R.: Fictitious crack propagation in reinforced concrete beams without debonding
- Valente, S. and Barpi, F.: Scale effects in cohesive process zone and structural response

**Session 3: Disorder and statistics**
- Chairman: B.I.G. Barr
- Baker, G.: Interface fracture energy and aggregate size effects in particulate solids
- Breyssse, D. and Renaudin, P.: On the influence of local disorder on size-effect
- Luong, M.P.: Representativeness of laboratory fracture testing
- Chong, K.P. and Kim, D.H.: Size-scale effects in the failure of brittle materials and composite structures
- Simoni, L., Mazzanti, G. and Montanari, G.C.: Dimensional effect in electrical breakdown of insulating materials and structures

**Session 4: Fractality and self-similarity**
- Chairman: K. Rokugo
- Bouchnad, E. and Bouchnad, J.P.: Fracture surfaces: apparent roughness, relevant length scales and fracture toughness
- Chudnovsky, A. and Kunin, B.: On the relationship between roughness of
fracture path and resistance to crack growth
Frantziskonis, G.N.: On the relation between fracture surface characteristics and material properties
Meredith, P.G., Hatton, C.G. and Main, I.G.: Non-universal scaling of stress-induced fractures in rock
Lange, D.A. and Shah S.P.: Roughness and fracture toughness of cement-based matrices

Session 5: Renormalization and scaling laws
Chairman: B.L. Karihaloo
Carpinteri, A.: Complete and incomplete similarity for the concepts of strength and toughness in disordered materials
van Mier, J.G.M.: Fundamental aspects of size and scale effects in brittle disordered materials
Herrmann, H.J.: Examples of fractals in rock mechanics
Krajcinovic, D.: Scale of the microstructural disorder and its effect on the damage incurred during the sol to gel transition
Naimark, O.B.: Failure scaling, fractality and local instability phenomena in the structure of materials

Session 6: Dynamic fracture and impact
Chairman: M.P. Luong
Bontempi, F. and Casciati F.: Renormalization techniques in the study of concrete elements of increasing size
Chen, E.P.: Dynamic brittle fracture simulation based on a continuum damage model
Cherepanov, G.P.: On the scale effect in superdeep penetration
Jones, N.: Some comments on the geometrically similar scaling of inelastic structures loaded dynamically
Mackawa, I.: Mechanical size effect on impact strength and the related applications

Session 7: Ductile materials
Chairman: D. Ferraro
Atkins, A.G.: Scaling in elasto-plastic fracture mechanics
Shan, G.X., Fischer, F.D. and Kolednik, O.: A numerical simulation of resistance curves - Geometry and size effects
Ritter, R.: Optical field methods for 3D-deformation measurement in fracture mechanics
Steck, E.A.: Influence of damage models on the prediction of crack propagation in ductile materials
Turner, C.E.: Size effects in the ductile crack growth of metals

Session 8: Quasi-brittle materials
Chairman: A. Di Tommaso
Barr, B.I.G.: Size effect study in three fracture test specimens
Kasperkiewicz, J.: Fracture energy of concrete - Nonstandard evaluation
Linsbauer, H.N. and Sajna, A.: Size-effect sensibility - Three point bending test (3PBT) versus wedge splitting test (WST)
Rossi, P.: A probabilistic discrete cracking model to take into account the scale effect of concrete in tension and compression

Session 9: Brittle matrix composites
Chairman: E.A. Steck
Ballarini, R., Islam, S. and Charalambides, P.G.: Near-tip dual-length scale mechanics of mode I cracking in laminate brittle matrix composites
Cox, B.N.: Size effects in textile composites
Rokugo, K., Uchida, Y. and Koyanagi, W.: Size effects on load-displacement curves and plural cracks of concrete beams in bending

Alberto Carpinteri

94–10

IUTAM Symposium on Mechanics and Combustion of Droplets and Sprays, 6-10 December 1994, the Institute of Aeronautics and Astronautics, National Cheng Kung University, Tainan, Taiwan

Scientific Committee

H.H. Chiu (Taiwan), Co-chairman F. Dursi (Germany)
N.A. Chigier (USA), Co-chairman C.K. Law (USA)
J. Bellan (USA) T. Niioka (Japan)
C.T. Bowman (USA) T. Tatsumi (Japan)
S.M. Candel (France) J.H. Whitelaw (UK)

Short Summary of Scientific progress achieved

This symposium was the first in the IUTAM symposium series to address the rapidly progressing field of research on droplets and sprays, a topic that emerged as a discipline of modern science and technology in recent decades. Early classical developments in droplet combustion along with largely empirical and semi-empirical correlations and statistical descriptions of atomization and spray combustion in the early fifties have since evolved into a mature interdisciplinary subject through an evolutionary process that included developments in versatile theoretical modelling, deployments of sophisticated optical and related experimental techniques and advanced computational software and hardware. There is an urgent need for symposium activities to allow for timely exposure of new developments to facilitate genuine progress and develop a scientific consensus on points of contention.

This symposium, organized by the Scientific Committee, brought together established researchers and young scientists from academia and industry for
a four-and-a-half day program of activities that provided an unique opportunity for the review and presentation of modern aspects of droplets and sprays. A wide spectrum of key subjects was covered in the lecture presentations under a stimulating environment conducive to the vigorous exchange of ideas. The symposium consisted of keynote lectures, invited lectures and panel discussions as well as a site visit to the spray combustion laboratory at the Aerospace Science and Technology Research Center, National Cheng Kung University.

The principal topics included atomization, droplet collisions, spray behavior and structure, interphase transport of isolated and interacting droplets, collective interaction and group phenomena in many-droplet systems, large-scale structures in non-dilute sprays, clouds, clusters, arrays and streams. Advanced optical and related diagnostic techniques, supercritical combustion, microgravity environment, and application of sprays in various liquid spray engines. All the lectures were grouped into four topical areas and presented in a single continuing lecture series, with each session consisting of one to four keynote lectures providing a review of state-of-the-art, major new developments, and several invited lectures presenting problems of current interest. A balance was maintained between experimental and theoretical developments to allow for greater breath, relevance, and validation of scientific accomplishments. The lectures consisted of twelve keynote lectures and twenty-eight invited lectures all of which were published as a preliminary proceeding provided to each participant. Panel discussions were conducted for the review of accomplishments in a wide range of experimental, analytical, and numerical techniques along with a critical assessment of scientific significance. Areas for future research were also identified.

Countries represented and number of participants

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Proceedings of the Symposium

A preliminary version of the proceedings was prepared prior to the Symposium and distributed to each participant. The final proceedings containing selected keynote and invited lectures will be published by Begell House by early 1996. (Editors: H.H. Chiu and N.A. Chigier)

Financial Support

The Symposium was successful, thanks to financial support from various sources. These funds were judiciously employed for international travel, accommodations, support service, organizing, publication, and other expenses. The Symposium organizers acknowledge the financial support of the International Union of Theoretical and Applied Mechanics (IUTAM) of US $7,500 (IUTAM grants were partially reimbursed, US $4,200 were taken from ICSU travel grants given to IUTAM. The support by ICSU is especially acknowledged). Names of recipients are in the files of the IUTAM Treasurer. The Symposium organizers recognize the additional financial support of: the International Science Foundation. The generous financial support provided by the Ministry of Education and National Science Council of the Republic of China is especially acknowledged. The support of National Cheng Kung University, Chung Shung Institute of Science and Technology, the Society of Theoretical and Applied Mechanics (Taipei), the China Aeronautical and Astronautical Society (Taipei) is also appreciated.

SCIENTIFIC PROGRAM

Session: Atomization, Droplet Collision and Spray Behavior
Co-chairs: J. H. Whitelaw, Y. Mizutani, F. Durst, T.S. Saitoh
N.A. Chigier: The Separate Influences of Air and Liquid Turbulence on Atomization*
F.V. Bracco: Transient Hollow-Cone Sprays
M.C. Lai, H. Sun, and T.H. Chue: Atomization and Vaporization Characteristics of Airblast Capillary - Fuel Injection inside a Venturi Tube
J. H. Whitelaw: Droplet Evaporation and Combustion in the Spray from a Coaxial Atomizer *
C. K. Low: Dynamics of Droplet Collision *
A.M. Podymskisty and V. V. Dubrovsky: Micromechanics of Drops Behavior in Multiphase Flows
B. E. Gelfand: Droplet Breakup Phenomena in Flows Velocity Lag

Session: Modeling, Simulation and Diagnostics I.
Co-chairs: N. A. Chigier, T.Niouka, C. F. Edwards, V. Yang
H.H. Chiu: Modern Developments in the Mechanics and Combustion of Many-Droplet Systems *
Y. Mizutani, F. Akamatsu, M. Katsuki, T. Tabata and K. Nakabe: Optical Observation of Group Combustion Behaviors of Premixed Sprays with and without Circular Rod Spray Behavior in Reacting and Non-reacting Flow Fields
V. G. McDonell, S. W. Lee, and G.S. Samuelsdon: Downstream of an Aeroplane Combustor Dome
J. Bellan: Dynamics and Thermodynamics of Dense and Dilute Clusters of Drops *
X. Q. Zhou and Y. Huang: Numerical Calculation of Flow Field in Aeroplane Combustors
Supercritical Pressure Environments
K. Annamalai: Interactive Transport Processes in Gasification and Combustion
D. Dunn-Rankin, W. A. Sirignano, R. H. Rangel, and M.E. Orme: Droplet Arrays and Streams

Session: Modeling, Simulation and Diagnostics II
Co-chair: H. Hiroyasu, D. Dunn-Rankin
F. Durst: Extended Phase-Doppler Anemometers and their Application to Measure Spray Properties
W. D. Bachalo: Spray Diagnostics Technique
F. Lacas, R. Snyder, G. Herding, J.C. Rolon: PLIF Imaging of Counterflow Spray Flame under Pressure
C. F. Edwards: Application of Ideal Spray Concepts to Understanding the Stochastic Dynamics of Sprays

Session: Diesel Engine Combustion and Supercritical Droplet Combustion
Co-chairs: F.V. Bracco, V. G. McDonell
H. Hiroyasu: Fundamental Spray Combustion Mechanism and Structures of Fuel Sprays in Diesel Engines
L.D. Chen and P.C. Sui: Atomization During the Injection of Supercritical Fluid into High Pressure Environment
V. Yang and G. C. Hsiao: Supercritical Vaporization and Combustion of Liquid Droplets
A. Umemura: Supercritical Droplet Vaporization and Combustion
S.C. Kong and R.D. Reitz: Diesel Combustion Modeling with Comparisons to In-Cylinder Flame Images
J.J. Liu: Observation of Internal Structure of a Diesel Spray Jet

Session: Applications of Droplets and Sprays
Co-chairs: J. Bellan, S.K. Aggarwal
Y. Tambour: Structure of Multisize Sprays and Its Effect on Spray Flame Properties
T. Niioka and H. Kobayashi: Ignition Experiment of Droplet Array in Normal and Microgravity Environment
C.A. Chen and J.T. Yang: Expansion Combustor
Y. Moriyoshi and T. Muroki: A Study on the Mixture Formation of a DISC Engine

Panel Discussion

* Keynote lecture

H.H. Chiu and N.A. Chigier

INTERNATIONAL SYMPOSIUM ON VISCO-ELASTIC FLUIDS,
4-7 JANUARY 1994, TOBAGO, WEST INDIES, IUTAM CO-SPONSORED.

Scientific Committee
H. Ramkissoon (Trinidad) Co-Chairman
C. Petrie (UK) Co-Chairman
D.D. Joseph (USA), also represented IUTAM
B. Mena (Mexico)
W. Mellowes (Trinidad)

Short summary of scientific progress achieved

It was the aim of this international symposium to bring together the experts and research workers to discuss recent work in the flow of viscoelastic fluids. This objective was certainly achieved. There were four one-hour Invited Lectures given by the leading experts in the field and contributed papers on the theoretical aspect as well as on such applicable topics as polymer elasticity, liquid crystalline polymers, suspensions and particulate solids, electro-rheological fluids and asphalts.

It was evident that the symposium was a success. The papers were well received and were punctuated with lively discussions and considerable interactions for which this meeting will be remembered. This was facilitated to a large extent by the unavoidable cancellation of some scheduled talks. This meeting produced new insights, new scientific contacts and would act as a catalyst for future work.
Countries represented and number of participants

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Proceedings of the Symposium


Financial support

Financial support of the Symposium was provided by the International Union of Theoretical and Applied Mechanics, The Caribbean Congress of Fluid Dynamics, The University of the West Indies and the Mexican Society of Rheology, the Royal Society and the University of Newcastle upon Tyne. The Symposium was also sponsored by the above (with the exception of the Royal Society) and the British Society of Rheology.

SCIENTIFIC PROGRAM

Session 1:
Chairpersons: D.R. Oliver & J. Mewis
K. Walters: Recent developments in Non-Newtonian Fluid Mechanics
Y.Y. Renardy: Weakly non linear interactions in two-layer flows
A.L. Leonov: The modeling of spurt flows of molten polymers
P. Espanol: Earthquake fault model for stick-slip dynamic in melt fracture
D. De Kee: Constitutive equations based on network theories

Session 2:
Chairpersons: D. De Kee, B. Mena & R.J. Atkin
K. Rahaman: Unsteady axial viscoelastic pipe flows
P.N. Kaloni: On the flow of viscoelastic fluid through a curved pipe
R.R. Huigol: Applications of the boundary integral method to the sedimentation of irregular shaped particles
M. Renardy: The stresses of an upper convected Maxwell fluid in a Newtonian velocity field near a reentrant corner
N. Phan-Thien: Mechanics of suspension and particulate solids
P. Henriksen: Developments in the parallel computation of viscoelastic flows
E. Mitsoulis: Viscoelastic effects in blade coating

Session 3:
J. Honerkamp: Modern methods of data processing in rheology
D.D. Joseph: Normal stress measurements
J. Mewis: Transient behaviour of thermotropic liquid crystalline polymers
L.F. del Castillo: The Kohlrausch-Stress relaxation function for poly-dispersed linear polymeric fluids
A.S. Lodge: Polymer elasticity
C. Friedrich: The fractional calculus approach of rheological constitutive equations
M. Whittle & W.A. Bullough: Dynamics of electro rheological fluids derived from pressure response experiments in the flow mode
R.J. Atkin: Steady flows of an electro rheological fluid

Session 4:
Chairpersons: C. Fredrich, P.N. Kaloni, & C.J.S. Petrie (Closing Ceremony)
P.A.P. Hastilow: A comparison of rheological models for extrusion-cooked wheat starch with data from both slit-die and parallel plate rotational oscillation rheometry
T. Peters & R. Whiting: Viscoelasticity in asphalts
B. Mena: A new kind of shear-elongational rheometer
C.J.S. Petrie: Spinning viscosity
L.G. Leal: Studies of the motion of viscoelastic liquids in extensional and mixed flows
D.D. Joseph: (a) Water lubricated pipeline flow, (b) Particle motion in Newtonian and non-Newtonian fluids

C.J.S. Petrie & H. Ramkisson

Report

Fifth IUTAM International Summer School

Concurrent Engineering Tools for Dynamic Analysis and Optimization
15 - 19 August 1994, Aalborg University, Denmark

Co-ordinators: E.J. Haug (USA), N. Olhoff (Denmark), W. Schiehlen (Germany).

Plenary Lecturers

M.P. Bendsoe (Denmark) E.J. Haug (USA)
D. Bestle (Germany) N. Olhoff (Denmark)
P. Eberhard (Germany) P. Pedersen (Denmark)
E. Lund (Denmark) J. Rasmussen (Denmark)
J.M. Hansen (Denmark) W. Schiehlen (Germany)
M.R. Hansen (Denmark) J. Wargo (USA)
Summary of Scientific Scope

Concurrent (or simultaneous) engineering implies early integration of all pertinent enabling disciplines into the process of engineering design, development and production, and offers the potential to reduce development time and costs, improve product functionality and quality, and generally compress the design, development and production cycle. The Summer School presented an overview of the state-of-the-art of concurrent engineering concepts and technological approaches to integrating tools and technologies, and emphasis was devoted to presentations of advanced enabling disciplines from theoretical, applied, and computer-aided mechanics and design for concurrent engineering of dynamic mechanical systems. Thus, a comprehensive presentation was given of recent developments in enabling tools for a broad range of dynamic mechanical systems. These tools comprise symbolic or finite element based multidisciplinary analyses, simulation, design sensitivity analysis, synthesis, formulation of performance criteria and constraints, and multicriterion optimization, and it was demonstrated how the tools can be effectively integrated into the framework of concurrent engineering.

Organization

The Summer School encompassed (i) invited plenary lectures, (ii) invited plenary demonstrations of scientific computer systems, (iii) presentations of contributed papers by the participants, and (iv) plenary discussions.

Countries represented and number of participants

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Lecture Notes


Financial Support

Financial Support for the Summer School was generously provided by the International Union of Theoretical and Applied Mechanics, and Aalborg University. In addition, travel grants were provided by the German Research Council.
Systems
J. Ehlers (Germany): An Example for the Optimization of a Semiactive Mechanical System
N. Standar (South Africa): Feasible Descent Cone Methods for Inequality Constrained Minimization Problems

Plenary Lecture Session 4: Dynamic System Design
D. Bestle: Formulation of Design Problems for Dynamic Systems
D. Bestle: Sensitivity Analysis of Multibody Systems
D. Bestle: Multicriteria Optimization of Multibody Systems

Plenary Lecture Session 5: Structural Design Sensitivity Analysis and Optimization
N. Olhoff: Finite Element Based Sensitivity Analysis and Multicriteria Optimum Structural Design
N. Olhoff: Sensitivity Analysis and Optimum Design with Respect to Simple and Multiple Eigenvalues of Conservative Systems

Plenary Lecture Session 6: Non-Conservative Dynamic Systems
P. Pedersen: Analysis and Sensitivity Analysis of Non-conservative Dynamic Systems
P. Pedersen: Optimization of Non-conservative Dynamic Systems

Plenary Demonstration Session 2: Demonstrations of Optimum Mechanism Synthesis and an Optimum Structural Design System
M.R. Hansen and J.M. Hansen: Multicriteria Optimization of Mechanisms
J. Rasmussen and E. Lund: Multidisciplinary Design Optimization with the ODESSY System

Contributed Papers Session 3:
Chairman: E.J. Haug
E. Lund and John Rasmussen (Denmark): A General and Flexible Method of Problem Definition in Structural Optimization Systems
D.E. Smith, D.A. Tortorelli and C.L. Tucker III (USA): Sensitivity Analysis and Optimization for Combined Sizing and Shape Design with Application to Polymer Processing
R.V. Grandhi (USA): Adaptive Nonlinear Approximations for Structural Reliability Analysis and Optimization

Contributed Papers Session 4:
Chairman: P. Pedersen
Y.M. Pochtman, S.A. Shulga and D.V. Nagorny (Ukraine): Optimization of Plates with Respect to Imperfections
O. Kust (Germany): Modeling and Optimization of Drivestring Dynamics

Plenary Lecture Session 7: Optimization of Structural Topology, Shape and Material

M.P. Bendsoe: Topology Design: The Homogenization Approach
M.P. Bendsoe: Optimum Design for Structural Topology, Shape, and Material

Contributed Papers Session 5:
Chairman: M.P. Bendsoe
O. Smith (Denmark): An Interactive System for Truss Topology Design with Automatic Generation of the Ground Structure
V.B. Hammer (Denmark): Strength Optimization of Laminates
L.A. Krog (Denmark): Multipurpose Topology Optimization for Optimum Rib Reinforcement of Plate and Shell Structures

General Discussion and Closing
Chairman: Werner Schiehlen

Social Program
The social program encompassed (i) a reception by the Lord Mayor at the City Hall of Aalborg, (ii) a guided evening walk in Aalborg, (iii) an excursion to the West Coast of Jutland and to The Skaw (Skagen), and (iv) a Summer School banquet.

N. Olhoff, W. Schiehlen

Donations in 1994
Donations given to IUTAM Symposia are recorded under the heading “Financial support” of the Reports of Symposia held in 1994. ICSU provided a grant of $12,600.00 for the support of the following activities:
1. IUTAM Symposium on Liquid-Particle Interactions in Suspension Flow
2. IUTAM Symposium on Waves in Liquid/Gas and Liquid/Vapor Two-Phase Systems
3. IUTAM Symposium on Structure and Dynamics of Nonlinear Waves in Fluids.

Representation in other organizations
ICSU
Prof. W. Schiehlen acts as Representative of IUTAM in the General Committee of the International Council of Scientific Unions.

CODATA
Prof. D.C. Drucker acts as Representative of IUTAM in the Committee on Data for Science and Technology.
COSPAR  
Prof. H.K. Moffatt acts as Representative of IUTAM in the Committee on Space Research.

COSTED  
Prof. R. Narasimha acts as Representative of IUTAM in the Committee on Science and Technology in Developing Countries.

IUPAP  
Sir James Lighthill acts as Representative of IUTAM in the International Commission on Acoustics under IUPAP.

SCOPE  
Prof. G.M. Lespinard acts as Representative of IUTAM in the Scientific Committee of the Environment.

SCOR  
Prof. S.A. Thorpe acts as Representative of IUTAM in the Scientific Committee on Oceanic Research.

TREASURER'S REPORT

Balance, December 31, 1993 ........................................ 347.514  
Excess of expenses over cash revenues for the year .............. 46.385  
Balance, December 31, 1994 ........................................ 301.129

Statement of cash revenues collected and expenses paid over the year:

Cash revenues collected
- Subscriptions ...................................................... 60.432  
- Interest income .................................................. 11.094  
- ICSU allocation .................................................. 12.600  
- Repayment Symposia ............................................. 3.015  

Total ............................................................ 87.141

Expenses paid
- Symposia .......................................................... 67.500  
- IUTAM Course ..................................................... 9.898  
- Other Technical Meetings ........................................ 9.888  
- Travel, Exec. Congress Committee ................................ 10.405

STATEMENT OF MOVEMENTS ON IUTAM BANK ACCOUNTS

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BANK ACCOUNTS OF IUTAM  

Bank Accounts:  
(2) Bank Mees Pierson NV., Postbus 2828, NL-2601 CV Delft, The Netherlands, Account N°.25 91 85 051  
(3) Deutsche Bank AG, Filiale Darmstadt, Darmstadt, Germany, Account N°.2363398  

Treasser: Prof. Bruno A. Boley, Department of Civil Engineering & Engineering Mechanics, Columbia University, New York, N.Y. 10027, U.S.A.  

Assistant Treasser: Prof. D.H. van Campen, Faculty of Mechanical Engineering, Eindhoven University of Technology, Postbus 315, NL-5600 MB Eindhoven, The Netherlands; Prof W.O. Schiehlen, Institut B für Mechanik, Universität Stuttgart, Pfaffenwaldring 9, D-70550 Stuttgart, Germany.

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS  

PAYMENT OF ANNUAL DUES  
(as of December 31, 1994)  

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Summary Record

of

the General Assembly of IUTAM

in Amsterdam, The Netherlands, on 27 and 28 August 1994

The General Assembly of IUTAM convened in the building of the Academy of Sciences, KNAW, Trippenhuis. The first session on 27 August was divided in two parts: The morning lecture session was scheduled:

09.00-12.00 hours : General Assembly, Lectures
09.00-09.30 hours : Opening by the President
09.30-10.30 hours : E. van der Giessen – Computational Micromechanics of Materials
10.30-11.00 hours : Coffee Break
11.00-12.00 hours : G.J.P. van Heijst – Vortices in two dimensional flows

The business session started at 14.00 hours. The second session on 28 August started with the morning lecture session:

09.30-12.00 hours : General Assembly, Lectures
09.30-10.30 hours : F.T.M. Nieuwstadt – Numerical simulation of turbulence with an application to drag reduction by polymers
10.30-11.00 hours : Coffee Break
11.00-12.00 hours : D.H. van Campen – Optimization of bells

and continued at 14.00 hours with the business session. The members of the Congress Committee, the Symposia Panels and all observers have been invited to attend the morning lecture sessions of the General Assembly meeting.

The first business session on 27 August started at 14.00 hours, the second business session on 28 August started at 14.00 hours.

The Persons Present:

a) Representatives of adhering organizations

Argentina:---; Australia: B.L. Karihaloo; Austria: A. Kluwick; Belgium:---; Brazil: proxy; Bulgaria:---; Canada: F.P.J. Rimrott, S.B. Savage, B. Tabarrok, proxy; China: You-Sheng He, Ren Wang, proxy, proxy, G.J. Hwang, proxy (Taiwan); Czech Republic: R. Dvorák; Denmark: N. Olof, P.T. Pedersen; Egypt: M.K. Ismail; Estonia: J. Engelbrecht; Finland: M.J. Mikkola, proxy; France: G. Iooss (on Sunday the 28th in the afternoon a
proxy was given to J. Salençon), R. Moreau, M. Roseau, J. Salençon; 
German: U. Gabbert, G. Kuhn, S. Wagner; Greece: A.N. Kounadis; 
Hungary: S. Kaliszky; India: B.C. Nakra, proxy, proxy; Ireland: J. Flavin; 
Israel: S.R. Bodner, Z. Hashin (on Sunday the 28th in the afternoon a proxy 
was given to S.R. Bodner); Italy: G. Bianchi, C. Cercignani, P. Podio-
Guidugli (on Sunday the 28th at 16.30 a proxy was given to C. Cercignani); 
Japan: K. Kawata, T. Tatsumi, Y. Yamamoto, proxy; Korea: --; Latvia: V. 
Tamsus; Netherlands: J.A. Battjes, D.H. van Camperen, J.F. Dijksman (on 
Sunday the 28th a proxy was given to D.H. van Campen); New Zealand: 
G.R. Dunlop; Norway: --; Poland: W. Gutowski, H. Zorski; Portugal: E.R. 
de Arantes e Oliveira; Russia: G.G. Chernyi, G.K. Mikhailov; Saudia 
Arabia: --; Slovakia: J. Brilla; Spain: --; Sweden: B. Lundberg, proxy; 
Switzerland: P.A. Monkewitz, M. Sayir; Turkey: --; UK: C.R. Calladine, 
T.J. Pedley (on Sunday the 28th at 16.30 a proxy was given to W.G. Price), 
W.G. Price, J.R. Willis (on Sunday the 28th at 17.00 a proxy was given to 
W.G. Price); USA: L.B. Freund, P.G. Hodge, Jr., proxy, proxy, proxy; 
Vietnam: --; Yugoslavia: --

b) Elected members

B.A. Boley (USA), D.C. Drucker (USA), I. Imai (Japan), J. Lighthill (UK), 
F.I. Niordson (Denmark), L.I. Sedov (Russia)

c) Bureau members not being representatives of adhering organizations or 
not being elected members, respectively

P. Germain (France), H.K. Moffatt (UK), W. Schielen (Germany), L. van 
Wijngaarden (The Netherlands), F. Ziegler (Austria)

d) Affiliated organizations

CISM: G. Bianchi; ICHMT: --; ICR: --; EUROMECH: B. Lundberg; 
IAVSD: --; ISIMM: M. Hayes; ICF: --; ICM: --; AFMC: R. Narasimha; 
IACM: proxy; CACOFD: H. Ramkisson

e) Invited observers

A. Acrivos (USA), I. Alfírević (Croatia), J.B. Martin (South Africa)

The Persons Represented By Proxies:

a) Adhering organizations

Brazil: L. Bevilacqua represented by F. Ziegler 
Canada: S. Dost represented by B. Tabbarok 
China: K.C. Hwang represented by Ren Wang, Z.M. Zheng represented 
by Y. He, H.H. Chiu represented by G.J. Hwang (Taiwan)

Finland: M.A. Ranta represented by M. Mikkola 
India: Y. Nath represented by B.C. Nakra, G. Prathap represented by 
B.C. Nakra 
Japan: H. Nakagawa represented by T. Tatsumi 
Sweden: F. Bark represented by B. Lundberg 
USA: G. Leal represented by P.G. Hodge, S. Leibovich represented 
by P.G. Hodge, T. Oden represented by P.G. Hodge 

b) Elected members

J. Hult (Sweden) represented by B. Lundberg (Sweden), N.J. Hoff (USA) 
represented by P.G. Hodge (USA), Y.H. Ku (USA) represented by Y. He 
(China)

c) Affiliated organizations

IACM: T. Oden (USA) represented by P.G. Hodge (USA)

Agenda

Saturday 27 August at 14.00 hours

1. Opening of the meeting by the President. Minutes of the Assembly 
1992
2. Report of the Secretary-General
3. Report by the Treasurer on financial matters
4. Preliminary discussion on annual dues
5. Report on relations with ICSU 
6. Report of the Secretary on the Congress Committee of IUTAM 
7. Adhering Organizations
  7.1 Bulgaria applied for change of membership from 
    Category II to Category I (to be reversed to 1992)
  7.2 Application for membership by Croatia (Category I) 
  7.3 Application for membership by South Africa (Category I) 
  7.4 Application for membership by Ukraine (Category II)
  7.5 Application for membership by Slovenia (Category I) 
8. Affiliated Organizations
  8.1 A repetition of application for membership by IABEM 
  8.2 Closer cooperation with the following affiliated organizations 
        IACM, ICR, ICM, ISIMM 
  8.3 Application for membership by ESIS 
  8.4 Preliminary Discussion of the affiliation of the International Institute 
        of Acoustics & Vibrations (Sir James Lighthill) 
9. Inter-Union Committees and Commissions
10. Matters concerning non-ICSU Organizations
11.1 Preliminary discussion on changes of Statutes (see Report 93, pp. 79–80)
11.2 Proposal of Electoral Committee
12. Publication of Proceedings of IUTAM-Symposia (see Report 93, pp. 80-82)
13. Preliminary discussion on future International Summer School on Mechanics
14. Preliminary discussion on future IUTAM Symposia

Sunday 28 August at 14.00 hours

15. Continued discussion and final decision regarding future IUTAM Symposia
16. Continued discussion and final decision on International Summer School on Mechanics
17. Continued discussion and final decision on changes of Statutes
18. Continued discussion and final decision on Publication of Proceedings of IUTAM-Symposia
19. Continued discussion and final decision regarding annual dues
20. Election of members of the Electoral Committee
21. Election of members of the Congress Committee of IUTAM (also in connection with item 8)
22. Election of members of Symposia Panels (in connection with item 8)
23. Election of members—at large
24. Date and venue of the next General Assembly
25. Any other business

Proceedings of the General Assembly
updated from circular GA–149

Item 1 – Opening of the meeting by the President

The President, Professor Leen van Wijngaarden, opened the meeting and greeted all members and observers welcome. The President pointed out that the General Assembly will not make any decisions today, Saturday 27 August. Minutes of the Assembly 1992 were accepted.

Item 2 – Report by the Secretary-General

The Secretary-General, Professor F. Ziegler, submitted the following report to the General Assembly on the activities of IUTAM since the last General Assembly in Haifa, Israel on 25 and 26 August 1992.

Mr. President, Dear Colleagues,

Two years have passed since our last General Assembly in Haifa, Israel. During that time I have had the sad duty of recording the death of a distinguished colleague and friend who has served our Union in the past. May I ask you all to stand in honor of our deceased, while I read his name.

Professor P.-Y. Zhou of China died in November 1993. He has been an eminent scientist in his country with a strong international reputation. He was honored as an elected member of the General Assembly since his election in 1980 up to his death.

Our sympathies and our grateful thoughts for his excellent work for our Union go to his family and to his nation.

Notes added in proof:


Professor Tongji Lin, China, passed away on July 29, 1993 at the age of 75. From 1982 – 1990 he was a member of the General Assembly. From 1979 – 1990 he served as the first Vice Editor-in-Chief and later as the Editor-in-Chief of Acta Mechanica Sinica. He guided the design and the establishment of China's first blowdown supersonic wind tunnel, which tremendously enhanced the development of Chinese experimental aerodynamics. From 1983 – 1991 he has been the Vice President of IUTAM's affiliated organization AFMC.

We shall commemorate their death at the next General Assembly.

I) National Adhering Organizations

The Bulgarian National Committee on Theoretical and Applied Mechanics asked for a retrospective change of membership status from category II to category I, effective 1 January 1992. A letter of the Bulgarian Academy of Sciences asking for that change prior to 1992 was not received at the IUTAM office, however, Bulgaria paid since then only a single annual fee. The Bureau did not approve this recent application but the General Assembly may do so. This matter will be discussed under Item 7.

The following applications for membership have been received and will be discussed under Item 7:

(1) Croatia: The application of the Croatian Society of Mechanics for membership in IUTAM was received on 10 March 1994 (Statutes are updated from the former Yugoslavian one of the former Croat section).

(2) South Africa: The application of the Foundation for Research Development (FRD) (supporting professional body is the Association for
Theoretical and Applied Mechanics (SAAM)) for membership in IUTAM was received on 10 February 1994 (with Statutes enclosed)

(3) *Ukraine*: The application of the National Academy of Sciences of Ukraine for membership of Category II in IUTAM, including the Statutes was received on 13 May 1994

(4) *Slovenia*: Application for membership of Category I by the Slovenian Mechanics Society was received on 7 June 1994 (Statutes are updated from the former Yugoslavian one of the former Slovenian section)

We thank sincerely our colleagues and friends retired before 31 December 1993 from our General Assembly for their devoted work.
Prof. J. Altenbach of Germany, Prof. R.H. Dawoud of Egypt, Prof. K.J. Miller representing the affiliated organization ICM and Prof. J.T. Stuart of UK.

We welcome our colleagues appointed before 31 December 1993 and look forward to a long and fruitful cooperation for the benefit and progress of our Union.

Dr. J.F. Dijksman of The Netherlands, Prof. T. Inoue representing the affiliated organization ICM, Prof. H.A. Morsy of Egypt and Prof. T.J. Pedley of UK.

II) Affiliated Organizations

The International Centre for Mechanical Sciences (CISM), Udine, Italy, agreed to organize an International Summerschool on Mechanics from 5–9 July 1993, fourth in a row in cooperation with IUTAM, under the title: "Engineering Mechanics of Fiber Reinforced Polymers and Composite Structures". Coordinators have been Professor Jan Hult (Sweden) and Professor G. Rammerstorfer (Austria). The Summerschool was well attended by 41 participants from 13 different countries.

ICR announced the XIIIth International Congress of Rheology to be held from 18–23 August 1996 in Quebec City, Canada.

EUROMECH, European Mechanics Society was established on 3 April 1993 with its Statutes published in EUROMECH Newsletter 2 (August 1993) based on a personal membership. The successful program on Euromech Colloquium is continued and the 2nd European Fluid Mechanics Conference will be held in Warsaw (Poland) from 20–24 September 1994 and the 2nd European Solid Mechanics Conference will be held in Genoa (Italy) from 12–16 September 1994. Lists of the Colloquia as reported by Secretary-General Bengt Lundberg (Sweden) have been included in my printed annual Reports 1992/93.

The International Association of Vehicle System Dynamics (IAVSD) organized the 13th IAVSD Symposium on the Dynamics of Vehicles on Roads and Tracks at the Southwest Jiaotong University, Chengdu, China from 17–23 August 1993. Further details are given in the report of Professor R.S. Sharp that is printed in my annual Report 1993.

The International Society for the Interaction of Mechanics and Mathematics (ISIMM) finally held its postponed STAMM 9 – Symposium in

Lisbon, Portugal at CMAF–Universidade de Lisboa from 23–29 July 1994, with Professor Franz Ziegler as a member of the Scientific Committee and representing IUTAM. Professor M.A. Hayes (Ireland) was recently elected to represent ISIMM in IUTAM.

ICF did not report about the 8th International Congress on Fracture that was scheduled for 1993 for Kiev, Ukraine. A report has been received in the meantime and will be included in my forthcoming annual report.

When Professor D.C. Drucker (USA) recently resigned as the IUTAM representative to ICM he suggested Professor S.R. Bodner (Israel) to become his successor. Acceptance of the invitation is still pending (in the meantime Prof. Bodner accepted the invitation). The 7th International Conference on Mechanical Behavior of Materials will be organized by ESIS to be held in The Hague, Netherlands from 28 May–2 June 1995. More than 1000 participants are expected. The announcement has been included in my annual Report 1993.

Professor R. Narasimha announced on behalf of AFMC the 6th Asian Congress of Fluid Mechanics to meet in Singapore from 22–26 May 1995.

IACM, the International Association for Computational Mechanics held the 3rd World Congress on Computational Mechanics, IACM–WCCM III, from 1–5 August 1994 in Chiba, Japan with Professor T. Kawai of the Science University of Tokyo as the Congress Chairman. Professor A. Samuelsson (Sweden) has been elected the new IACM President following the outgoing president Professor J.T. Oden.

CACOFD organized successfully the IUTAM co-sponsored International Symposium on Visco-elastic Fluids, 4–7 January, 1994, in Tobago, W.I. IUTAM was officially represented by Professor D.D. Joseph (USA). 38 participants from 9 countries should be mentioned here.

Additional information is contained in my printed annual Report 1993.

Under Item 8 the definite steps taken by the Bureau for a closer cooperation with the affiliated organizations are reported to you. Letters of invitation to intensify the relations have been sent to IACM, ICR, ICM and ISIMM with an extremely positive echo received in response from Professor J.T. Oden, president of IACM.

Applications for affiliation with IUTAM have been received from the following organizations:
- International Association of Boundary Element Methods (IABEM) (renewal of its application of 1992, it clarified its relation to IACM that it has never been formally affiliated to the latter)
- European Structural Integrity Society (ESIS)
- International Society for Structural Optimization (ISSO)

The first two applications will be discussed under item 8.

The following report that may be of immediate interest has been received in the meantime at the IUTAM Office and therefore is included in GA-149:

**The 8th International Conference on Fracture (ICF8)**

The 8th International Conference on Fracture "ICF8" was held in Kiev in
Ukraine in June 1993. The 8th International Conference on Fracture (ICF8) organized by the Academy of Sciences of Ukraine and the International Congress on Fracture (ICF), is undoubtedly the most significant international event in Ukrainian science over the past 5–10 years. The Conference was held from 8–14 June 1993 in Kiev the capital of Ukraine. This was the first time an ICF Conference had been held in Eastern Europe. The International Conferences on Fracture are quadrennial events organized by ICF. The "Olympic Games" of fracture mechanics were previously held in Sendai (1965, Japan), Brighton (1969, UK), Munich (1973, Germany), Waterloo (1977, Canada), Cannes (1981, France), New Delhi (1984, India) and Houston (1987, USA). At ICF7 bids were made by several internationally known scientific centers to hold the next Conference in their country. Among them were Kiev (Ukraine), Sidney (Australia) and Dublin (Ireland). In view of the vigorous activities of Ukrainian scientists and their prominent achievements in the field of metals fracture the staging of this significant world event was entrusted to the Ukrainian Organizing Committee headed by Prof. V.V. Panasyuk, Director of the Physico-Mechanical Institute of the Academy of Sciences of Ukraine.

Owing to the changes which have occurred in the political system and economic life of Ukraine, the ICF8 Organizing Committee had to overcome many different obstacles. Moreover, the organizers had to contend with the prejudices of some overseas scientists who thought that ICF8 could not be successfully held in Ukraine. Our thanks must be expressed to ESIS, one of the ICF8 sponsors, its leaders, the chairmen and members of committees: Dr. I. Milne, ESIS President, Prof. A. Bakker, ESIS Secretary, Prof. J.M. Miller, "FFEMS" Editor-in-Chief, Prof. D. Pirrato, Prof. D. Francois, Prof. J.F. Knott, Prof. K.H. Schwabbe, Prof. M.O. Speidel. They provided support to the ICF8 National Committee, invited prominent European scientists in the field of fracture mechanics to participate in ICF8 and established their own friendly contacts with Ukrainian scientists, all of which helped to make ICF8 a success. The total number of participants was more than 550, among them 159 overseas participants from 30 countries: 20 from Germany, 18 from the USA, 17 from France, 15 from the UK, 12 from India, 11 from P.R. China, 7 from Japan, etc. Ukraine was represented by 240 scientists, Russia by more than 150. The working language of the Conference was English.

The first plenary meeting of the Conference was of particular, even ritual significance. It was held in the Conference Hall of Kiev Polytechnic Institute. Prof. V.V. Panasyuk, Chairman of the ICF8 Ukrainian National Organizing Committee, delivered his welcome address, Prof. P. Rama Rao, ICF President welcomed the participants of ICF8 and declared the Conference open. Then the Vice-President of Ukraine Prof. M. Zhulinsky, read a welcome address by the President of Ukraine, L.M. Kravchuk, to the participants of ICF8. The President of the Academy of Sciences of Ukraine, Prof. B. Ye. Paton, and the Rector of Kiev Polytechnic Institute, M. Zgurovsky, also addressed the delegates.

The ICF8 Honorary Lecture by Prof. V.V. Panasyuk was delivered at the first plenary meeting. The A.A. Griffith Memorial Lecture was presented by Prof. J.F. Knott, a foreix member of the Academy of Sciences of Ukraine.

In accordance with the Program, the Conference continued its work in 10 sections. In addition there were well attended round table discussions on: "Education and training in strength and fracture"; "Interrelation between Macro- and Micromechanics and Fracture"; "Problems of Aircraft Aging".

The last theme attracted the greatest attention. In particular, Prof. M.L. Williams stressed that ICF supports the exchange of scientific information among researchers and engineers engaged in the field of fracture mechanics. Aircraft aging and resource prediction are problems of great urgency, but similar problems exist in other fields of engineering. The determination of this problem and its understanding by investigators and engineers were discussed, including the design principles and correctness of data processing methods. Data from exploitation experience under environmental effects were also given. More than 700 papers were presented at the Conference, including nearly 100 by invitation (10 papers for each section).

In spite of economic difficulties ICF8 was well organized. The delegates were located in the "Pushcha Ozerna" sanatorium in a uniquely picturesque part of Kiev. It provided perfect conditions for the work of the numerous sections and the combined plenary meetings. All ICF8 participants received souvenir bags containing symbolic and scientific material depicting the role of Ukrainian science in this branch of knowledge, together with other ICF8 material.

Meals and entertainment were well organized. Among the evening arrangements there was an interesting and successful meeting of Conference participants, with a presentation of Ukrainian scientific societies. Co-organizers of this meeting were the ICF8 National Organizing Committee (Prof. V.V. Panasyuk), the Science and Culture Committee on Relations with Ukrainians Abroad, affiliated to the Academy of Sciences of Ukraine (Prof. S. Yatskyv), Shevchenko Scientific Society (Prof. O. Romaniv) and the Association of Ukrainian Electric Welders (Prof. S. Kuchuk-Yatsenko). Shevchenko Scientific Society prepared a unique information document in English (editor Prof. O.M. Romaniv) "Investigations of Materials Strength, Fracture and Integrity. Views from Europe". The publication provides an analysis of the considerable success of Eastern European scientists in the field and their contribution to the development of solutions to this problem.

A special issue of the "Fizyko-Chimichna Mechanika Materialiv" journal was prepared for the ICF8 participants. It was dedicated to the A.A. Griffith centenary. The papers by well-known scientists in the field of materials fracture and structural integrity were published in English. The Conference provided an overview of the significant achievements of world science on materials fracture and structural integrity with Ukraine among the leaders.

ICF8 created a real basis for the establishment of scientific contacts and cooperation between scientists from different countries. Ukrainian science was worthily represented in this field of knowledge, thus promoting its consolidation in the world scientific process.

V.V. Panasyuk
III) Meetings of the Bureau

First meeting.

The Bureau met in Kyoto, Japan, on 29 and 30 May 1993. A summary record was mailed to all members of the General Assembly under the circular numbered GA-144. An updated record is included in my printed Report 1993.

Since a timely decision had to be made, the Bureau approved the applications for membership in category I of the two separate countries Czech Republic and Slovakia. Both Academies of Sciences at this time had been recognized by ICSU. The transformation from category II of former Czechoslovakia into two memberships of category I is to be noted. The General Assembly is kindly requested to acknowledge and accept (by acclamation) this extraordinary step.

Membership of the Czech Republic and of Slovakia, effective 1993, was accepted by the General Assembly by acclamation.

Further the Bureau decided to send a delegation of three, our representative to IACM Professor E.R. de Arantes e Oliveira (Portugal), Professor W. Schiehle (Germany) and Professor T. Tsutsumi (Japan) to attend the IACM Executive Committee meeting that was held during the WCCM’94 in Chiba, Japan. Their report will be given under item 8.

Professor S.A. Thorpe (UK) accepted the invitation to represent IUTAM in the Scientific Committee on Oceanic Research (SCOR).

Professor Jan Hult (Sweden) retired as the representative of IUTAM to ICSU after participating in the 24th General Assembly of ICSU that was held in Santiago de Chile from 4–8 October 1993. Professor W. Schiehle (Germany) was nominated by the Bureau and has been accepted by ICSU as the new IUTAM representative effective 1 November 1993.

From three proposals received in time the Bureau selected the fifth International Summerschool on Mechanics on Concurrent Engineering Tools for Dynamic Analysis and Optimization. It was held at the University of Aalborg in co-operation with the University of Stuttgart from 15–19 August 1994, organized by Professor Niels Olhoff (Denmark) and Professor Werner Schiehle (Germany) with Professor Edward J. Haug (USA) functioning as the third principal lecturer. Further discussions are scheduled under item 13.

Further the Bureau discussed an addition to the Statutes (XV) and proposes an alteration of the procedure for election of the members of the Bureau. The proposals are based on preparatory work of Profs. B.A. Boley, P. Germain, H.K. Moffatt and L. van Wijngaarden and have been included in my printed Report 1994 on pages 79-80. The proposals will be treated today under item 11 and tomorrow under item 17.

Based on preparatory work of Profs. G. Chernyi, W. Schiehle, T. Tsutsumi and F. Ziegler concerning the publication of the Proceedings of IUTAM Symposia, the Bureau is proposing Kluwer Academic Publishers as the officially designated publisher effective 1 January 1996. First of all it should be mentioned that an overwhelming majority is in favor of publishing proceedings of IUTAM Symposia. Secondly, Kluwer has already established series publications in Fluid and Solid Mechanics and the series editors Profs. R. Moreau (France) and G.M.L. Gladwell (Canada) heartily welcomed the refereed papers of future IUTAM Symposia, the chairman of the Symposium will be the editor. The drafts of the standard conditions and the agreement between IUTAM and Kluwer Academic Publishers are printed on pages 80-82 of my printed report 1993. The proposal by the Bureau will be treated today under item 12 and tomorrow under item 18.

Second meeting.

The Bureau met yesterday here in Amsterdam. The meeting was mainly devoted to the preparation of our General Assembly now in session.

Third meeting.

The Bureau will meet on Monday next week for the implementation of decisions taken by the General Assembly. On that occasion the Bureau will appoint the date and venue of its next annual meeting to be held in 1995. This will be reported to all of you in the minutes of the Bureau meeting.

Note: The Bureau of IUTAM will hold its next meeting on Sunday, 10 September 1995 and on Monday, 11 September 1995 at the Technical University of Vienna, in Vienna, Austria hosted by the Institute f. Allgemeine Mechanik, (head: F. Ziegler). Also meetings of the Executive Committee of the Congress Committee will take place in Vienna on this occasion.

IV) IUTAM Symposia held

In all, 18 IUTAM Symposia have been held in the period of this report. Full accounts of the seven symposia held in 1992 and the eleven symposia held in 1993 are given in my printed annual Reports for these years.

In 1994 the following four symposia were held so far: IUTAM Symposium on Liquid-Particle Interactions in Suspension Flow (Grenoble, France).
IUTAM Symposium on Waves in Liquid/Gas and Liquid/Vapor Two-Phase Systems (Kyoto, Japan).
IUTAM/ISIMM Symposium on Structure and Dynamics of Nonlinear Waves in Fluids (Hanover, Germany).
IUTAM Symposium on Microstructure-Property Interactions in Composite Materials (Aalborg, Denmark).

Six more symposia will be held this year: IUTAM/ISIMM Symposium on Anisotropy, Inhomogeneity and Nonlinearity in Solid Mechanics (Nottingham, UK), 30 August - 3 September 1994.
IUTAM Symposium on Laminar-Turbulent Transition (Sendai, Japan), 5 - 9 September 1994.
IUTAM/IASPEI Symposium on Mechanical Problems in Geodynamics (Beijing, China), 5 - 9 September 1994.
IUTAM Symposium on the Active Control of Vibrations (Bath, UK), 5 - 8 September 1994.
IUTAM Symposium on Size-Scale Effects in the Failure Mechanisms of Materials and Structures (Torino, Italy), 3 - 7 October 1994.

Further, the Bureau of IUTAM has agreed to co-sponsor the following meeting:

ISIJ-International Symposium on Electromagnetic Processing of Materials, EPM'94 (Nagoya University, Japan), 25 - 28 October 1994, the IUTAM representative will be Professor K. Moffatt.

More details are given in the Newsletter N-18 of 25 January 1994

V) IUTAM Symposia in preparation for 1995

Ten IUTAM Symposia are in preparation for the coming year, note the change of dates of the IUTAM Symposium on Physical Limnology. Again more details are given in the Newsletter N-18.

IUTAM Symposium on Advances in Nonlinear Stochastic Mechanics (Trondheim, Norway), 3 - 7 July 1995.
IUTAM Symposium on Constitutive Relation in High/Very High Strain Rates (Tokyo, Japan), 16 - 19 October 1995.

Further, the Bureau of IUTAM has agreed to co-sponsor the following meeting:

IABEM International Symposium on Boundary Integral Methods for Nonlinear Problems (Certosa di Pontignano, University of Siena, Italy), 28 May - 3 June 1995, the IUTAM representative will be Professor F. Ziegler.

VI) Publications of IUTAM

In the period 1992/93/94 the Proceedings of 22 IUTAM Symposia have been published. In 1993 the Proceedings of the 18th ICTAM, edited by S.R.

Bodner, J. Singer, A. Solan and Z. Hashin have been published by Elsevier Science Publisher, Amsterdam. All details as to editors and publishers are given in my printed annual Report 1993.

The annual Reports of IUTAM are available from the Secretariat of IUTAM. They have been distributed to all members of the General Assembly and to a large number of persons and organizations showing interest in the activities of our Union as well. We have made attempts to have these Reports available at our IUTAM-Symposia.

The IUTAM Archive has been established with the International Centre for Mechanical Sciences (CISM). The IUTAM files from the years 1976-1984 are deposited with the IUTAM Archive. The Bureau of IUTAM recommends to collect photos from IUTAM meetings with the Archive in Udine, Italy, too.

Mr. President, dear colleagues in the Bureau, dear colleagues and friends in the General Assembly, before I conclude my report I would like to thank you all for your advice, for your cooperation and for your help on which I could rely during the first half of my term in office. I enjoyed working with you, to serve our Union and to promote mechanics as a science. In my first two years in office, I had to learn my lessons but I also gained a lot of experience and I got friends in all parts of the world. Indeed, it is a great privilege to be part of this body, and I have to express my deeply felt gratitude to all of you. Thus, IUTAM especially through its Symposia is offering a strong basis for future developments of mechanics, as a science, as the fundament of technology, in its application to the environment and for natural disaster reduction and for the invention of new engineering tools.

The report by the Secretary-General was unanimously adopted.

The President thanked the Secretary-General for the precise report and his closing words.

Item 3 - Report by the Treasurer

The Treasurer, Professor B.A. Booley, submitted the following report to the General Assembly.

Mr. President, Dear Colleagues:

You are all familiar with the story of Cassandra, that Trojan princess of exceeding beauty. Apollo - you may recall - had bestowed upon her the gift of prophecy in the hope of reaping enjoyment of that beauty; but ordained that no prophesies of hers would ever be believed when she failed to respond. Now, it is in the nature of the Treasurer's job not only to report on the current state of the finances of IUTAM, but more importantly to make some predictions - and that is a very difficult thing to do, particularly (in Samuel Goldwin's immortal observation) when the predictions are about the future.

I bring up Cassandra only to emphasize that there is no similarity between
her case and mine - except possibly in the point of great personal beauty.
My prophecies are as uncertain as anybody else's not acquainted with
Apollo, and at any rate I do not prophesy impending doom, but merely wish
to advise that a bit of caution appears now to be in order, if the future
welfare of our beloved Union is to be safeguarded.
Thus I am pleased to report to the General Assembly that the financial
state of our Union is good. It is obvious that the entire merit for this is to be
credited to my predecessors' account, and I want to acknowledge at the
outset the deep gratitude which I - and indeed all of us - owe to them.
We have been able to meet all our financial commitments, including the subsidy
to an increased number of Symposia and the IUTAM Course during the last
few years, as well as somewhat increased travel and office operating
expenses. Our members have in large part faithfully paid their Annual Dues,
including a few whom I especially thank for bringing their accounts fully up
to date. These matters are evident from the IUTAM 1993 Annual Report
that is in your hands, which also shows our healthy asset balance of over
$347,000 at the end of the year.
At the beginning of 1993, the credit balance amounted to about $383,000,
so that a decrease of almost $36,000 was experienced during the year. That
is just 9.4% of our assets, but it is an impressive 35% of our total yearly
income. Even so, our assets are comparatively larger than many other
Scientific Unions enjoy, since they are still almost 5 times the annual income
from subscription dues. At the same time, it must be noted that during the
preceding year the total balance decreased only 1.7% (or 5.9% of yearly
income). The less favorable recent experience results from the above
mentioned increased expenses, as well as from a significant drop in the
available interest rates. Our expenses will certainly not diminish in the
coming year, and our interest income will also suffer, as most of our older
high-interest notes mature, and are replaced by less profitable ones. Hence
the note of caution which I sounded at the start.
Let us look at the situation a little more closely. Let us suppose that a
reasonable balance for us would be about twice, rather than 5 times, the
annual subscription dues income; in other words about $150,000. How long
it would take us to reach that level depends of course on the future annual
loss: if the present $36,000 amount is any guide, it would take about 6 years,
that is until the year 2000. After that, a new spending policy would have to be
in place so as to prevent further erosion, and to establish firmly a steady-
state. That time is merely 1.5 IUTAM Units away - where the IUTAM Unit
is defined as the period between International Congresses measured under
standard conditions. But some little time is always needed to formulate a
new policy, particularly when many of our commitments (notably our
Symposia) are decided upon several years in advance. It is therefore clear
that we cannot wait.
The time is now, while there is no impending crisis and calm deliberation
is possible. This is the time to plan carefully for our long-term future, and
to proceed cautiously in the short term. I believe we should revisit our
policies, to see how many Symposia we wish to sponsor, and at what dollar
level. We should also go further, and see whether there might be other
expenditures that would effectively affirm and draw attention to IUTAM's
unique and pre-eminent position in the broad field of mechanics.
At the moment, we have an immediate decision to take, concerning the
level of dues for the years 1996 and 1997. IUTAM's dues, as indeed those of
ICSU, have been traditionally based on the OECD inflation level. For 1996
and 1997 ICSU proposed increments of 1.5% to 2.5% over the OECD rate,
resulting in total increases in the neighborhood of 5% to 6%, but possibly as
high as 8%. I propose that we pursue a similar course, and adopt increases
of about 5% each year, from the 1995 level of US$ 512. That would yield
to pay equal amounts in each of these two years, I propose that dues be set at
US$ 551 (the present level is US$ 503).
In my capacity as Treasurer, I have enjoyed dealing with many of you, and
many other different people in our field. I look forward to the pleasure of
continuing to do so, and to discussing some of the points I have raised,
during the remaining two years of my term in office.
The report by the Treasurer was unanimously adopted.
The President thanked the Treasurer for his most successful work.
Prof. Drucker seriously asked for measures to find a balance of income and
spending and in particular to review the activities of IUTAM in that respect.

Item 4 – Preliminary discussion on annual dues
Higher rates as proposed by ICSU may have the effect of downgrading the
category of membership. A 5% increase may be o.k. The recommendation
given in the Treasurer's report was supported by the General Assembly. It
was noted that the final decision regarding annual dues would be made in the
second session of the General Assembly, see item 19 below.

Item 5 – Report on relations with ICSU
ICSU provided grants for three IUTAM-Symposia in 1994 and co sponsors
three IUTAM-Symposia in the year 1995 as listed below. These grants are
gratefully acknowledged.
94-7 IUTAM/IASPEI Symposium on Mechanical Problems in Geodynamics
Place: Beijing, China
Date: 5 - 9 September 1994
Chairman: Professor R. Wang
Dept. of Mechanics
Peking University
Beijing 100871, CHINA
Telefax: +86 1 2501826

94-9 IUTAM Symposium on Size-Scale Effects in the Failure Mechanisms
94-10 IUTAM Symposium on Mechanics and Combustion of Droplets and Sprays

Place: Taipei, China
Date: 6-8 (or 10) December 1994
Chairmen: Professor N. A. Chigier
           Carnegie-Mellon University
           Pittsburgh, PA 15123, USA
           Professor H. H. Chiu
           Institute of Aero. and Astro.
           National Cheng Kung University
           Telefax: +88662389940

95-5 IUTAM Symposium on Hydrodynamic Diffusion of Suspended Particles

Place: Boulder, USA
Date: 23-25 July 1995
Chairman: Professor H. Davis
           University of Colorado
           Boulder, CO 80309-0424, USA
           Telefax: +1 303 492 4341

95-7 IUTAM Symposium on Nonlinear Analysis of Fracture

Place: Cambridge, UK
Date: 3-7 September 1995
Chairman: Prof. J.R. Willis
           Dept. of Appl. Math. and Theoretical Phys.
           Cambridge University
           Silver Street
           Cambridge CB3 9EW, UK
           fax: +44 223 337918

95-8 IUTAM Symposium on Physical Limnology

Place: Darwin, Australia
Date: 18–23 September 1995
Chairman: Professor J. Imberger
           Centre for Water Research

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

University of Western Australia
Nedlands 6009, AUSTRALIA
Telefax: +6193801090

IUTAM is a member of ICSU of adhering category 3 and the dues for 1995 have been set to US$ 2,154.---. The dues for 1996 will be increased by 4.83% over the 1995 dues.

The representative of IUTAM on the General Committee of ICSU, Professor Werner Schiehlen, submitted the following report to the General Assembly.

Mr. President, Dear Colleagues,

My term as representative of IUTAM with ICSU began on 9 October 1993 after the 24th General Assembly of ICSU in Santiago de Chile. The report on the 24th General Assembly was submitted by Professor Jan Hult and it is printed in IUTAM's annual report 1993.

Two meetings of the General Committee of ICSU took place before and after the General Assembly in 1993. The 31st meeting on 1-2 October 1993 was attended by Professor Jan Hult and is also mentioned in his report. The 32nd meeting was scheduled for 8 October 1993 to welcome the new members of the General Committee. Since I was not able to participate in this meeting, my appointment was approved later by ICSU in writing.

At the time being, the 33rd meeting of the General Committee to be held on 13-15 October 1994 in Rabat, Morocco, is under preparation.

On the agenda are the following items:
- Recommendations of the Standing Committee on Membership, Structure and Statutes
- Report on Executive Board Discussions on Overall Purposes and Procedures of ICSU
- Seminar on Confronting Complexity
- Scientific Priority Setting
- Review of Interdisciplinary ICSU Bodies
- Working Group Sessions on Biological Sciences and Earth Sciences
- Future Actions of ICSU including Developing Countries, Bio-diversity and Nuclear Waste Disposal

Further, ICSU is offering lectureships and professorships in science and sustainable development for developing countries.

The question of overall purposes and procedures of ICSU has been brought forward to all members of ICSU. IUTAM has also been asked for comments.

On a workshop in November 1993, the CODATA Task Group on Artificial Intelligence and Computer Graphics (AIGRA) discussed the standardization of data and databases including CAD/CAM applications.

The Third World Academy of Sciences (TWAS) celebrated its 10th anniversary.

The International Decade for Natural Disaster Reduction (IDNDR) organized a World Conference on Natural Disaster Reduction in Yokohama,

The report by Prof. W. Schiehlen was unanimously adopted and the President thanked him for his great efforts.

Item 6 – Report of the Secretary on the Congress Committee of IUTAM

The Secretary of the Congress Committee, Professor Niels Olhoff, submitted the following report.

Mr. President, Dear Colleagues,

I am pleased to report that the arrangements for the 19th International Congress of Theoretical and Applied Mechanics (ICTAM) which will be held in Kyoto, Japan, in August 1996 are progressing very well. The dates are Sunday 25 – Saturday 31 August 1996, and the Congress will be held in the Kyoto International Conference Hall which is a very imposing complex with all necessary facilities. Professor Tomomasa Tatsumi will be the President and Professor Eiichi Watanabe the Secretary General of the Congress, and they preside the local organizing committee which is in charge of all the local arrangements.

I would like to take this opportunity to thank, on behalf of the Congress Committee, the many members of the General Assembly that have put forward suggestions on matters pertaining to the planning and organization of the Congress. These suggestions have been considered most carefully by the Congress Committee and its Executive Committee, and you will find that many of them have been implemented.

A preliminary announcement of the Congress has already been widely distributed and published in many journals, and there has been an encouraging response. As announced, in Kyoto there will be six Mini-symposia on designated topics within the framework of the Congress. Each Mini-symposium will have a Chairman and a Co-chairman. These are as follows:

- Vorticity dynamics and turbulence
  Chairman: Dr. R.M. Kerr (National Center for Atmospheric Research, USA)
  Co-Chairman: Dr. S. Kida (Kyoto Univ., Japan)

- Non-Newtonian fluid flow
  Chairman: Prof. K. Walters (Univ. College of Wales, UK)
  Co-Chairman: Prof. R.A. Brown (MIT, USA)

- Aero- and hydroacoustics
  Chairman: Prof. J.E. Frowcs-Williams (Univ. of Cambridge, UK)
  Co-Chairman: Prof. A. Prosperetti (John Hopkins Univ., USA)

- Mechanics of heterogeneous and composite solids

Arrangements for the introductory sessions for each of these Mini-symposia are well advanced.

As has been also announced, a number of “Pre-nominated Sessions” has been selected for the Congress in Kyoto. These sessions are devoted to typical topics within the field of theoretical and applied mechanics which are not covered by the mini-symposia. The Pre-nominated Sessions are as follows:

- Fluid mechanics: Biological fluid mechanics; Boundary layers; Combustion problems; Compressible flow; Computational fluid mechanics; Diffusion problems; Experimental methods in fluid mechanics; Flow instability and chaos; Free surface/interface problems; Geophysical fluid dynamics; Magnetohydrodynamics; Multi-phase flows; Reacting flows; Thermodynamics; Topological fluid mechanics; Vortex Dynamics;

- Solid mechanics: Active and passive structural control; Biomechanics; Chaos in dynamics; Computational solid mechanics; Contact and friction problems; Damage Mechanics; Dynamic plasticity of structures (crash mechanics); Elasticity; Experimental methods in solid mechanics; Fracture and crack mechanics; Impact and wave propagation; Material instabilities; Multi-body dynamics; Plasticity; Plates and shells; Rock and geomechanics; Scaling laws for mechanics of fracture; Stability of structures; Structural vibrations; Viscoelasticity and creep;

- Solid-fluid mechanics: Earthquake engineering; Environmental fluid and solid mechanics; Fluid-structure interaction problems; Sport mechanics.

Both the Chairmen of the Mini-symposia and of the Pre-nominated Sessions will stimulate scientists within the respective sub-fields to submit contributed papers for possible presentation at the Congress. It should be mentioned that papers on other topics are equally welcome and will be organized in other sessions. All accepted contributed papers will be presented either in Lecture Sessions or in Seminar Presentation Sessions.

The Congress Committee met yesterday and I am glad to report that it agreed to invite the following to give the important Opening and Closing Lectures:
Opening Lecture: Prof. Takaji Kobori (Univ. of Kyoto, Japan)
Closing lecture: Prof. Sir James Lighthill (Univ. College of London, UK)

The Congress Committee also agreed a shortlist of about 25 proposals for Sectional Lectures and a list of Chairmen of the above 40 Pre-nominated Sessions from the many suggestions put forward both by the members of the Congress Committee and by the National Adhering Organizations of IUTAM. The Executive Committee will agree tomorrow on the final list of 15 Sectional Lectures. Invitations to the Opening, Closing, and Sectional Lecturers and to the Chairmen of the Pre-nominated Sessions will be issued as soon as possible. A new announcement containing the new information will be issued and widely distributed later this year.

The Congress Committee yesterday discussed the idea of the Bureau to intensify and strengthen IUTAM's relations and cooperation with its Affiliated Organizations. The Committee strongly supports the idea and agreed to consider holding of joint Mini-symposia and Pre-nominated Sessions with Affiliated Organizations at future Congresses, and to recommend the General Assembly to elect representatives of Affiliated Organizations as members of the Congress Committee. As a first step towards joint activities, it was agreed to collaborate with IACM on the organization of the two Pre-nominated Sessions on Computational fluid mechanics and Computational solid mechanics which, as I mentioned earlier, will be held at the forthcoming Congress in Kyoto. In fact, IACM has already been invited to nominate the Chairmen for these Sessions. Regarding membership of the Congress Committee by representatives of selected Affiliated Organizations, a concrete proposal will be presented shortly.

Looking ahead to the 20th Congress (ICTAM) in year 2000, the Congress Committee has given preliminary consideration to provide venues for this event. Invitations have been received from Warsaw, Poland, Chicago (an invitation issued by a consortium of universities in the Midwestern States) USA, Göttingen, Germany, and Leeds, UK. Each of these invitations were presented and discussed at the meeting of the Congress Committee yesterday. The invitations will be considered further up to the Congress in Kyoto where the final decision will be taken.

Finally, Mr. President, may I ask the General Assembly to consider the question of membership of the Congress Committee. The present membership is set out on page 17 of the 1993 Report. Currently, there are 35 members and the Congress Committee recommends that this number be not increased. The terms of 13 members of the Congress Committee expire in 1994. Of these, the Executive Committee recommends reappointment of Profs. Calladine, Cercignani, Hayes, Wang and Ziegler who are eligible for a second 4-year term. The Committee also recommends that Profs. Acrivos, Kaliszyk and Schiehlen be reappointed as this is desirable in view of Profs. Acrivos' and Kaliszyk's membership of the Executive Committee, and Prof. Schiehlen's membership of the Bureau. This leaves room for 5 potential vacancies. The Congress Committee strongly recommends that some of these vacancies give room for membership by representatives of Affiliated Organizations of IUTAM. I may remark that ISIMM is already represented in the Congress Committee via Prof. M.A. Hayes.

- We wish to recommend the following as new members of the Congress Committee: Prof. T. Ioune (Japan), representative of ICM; Prof. J. Jimenez (Spain); Prof. B.L. Karihaloo (Australia); Prof. B.C. Nakra (India); Prof. J.T. Oden (USA), representative of IACM.

- The Congress Committee wishes to express its warm thanks to Prof. J.D. Achenbach (USA), Prof. A. Crespo (Spain), Prof. J. Lemaitre (France), Prof. R. Narasimha (India) and Dr. J.R. Philip (Australia) for their valuable cooperation in the work of the Committee.

The report by the Secretary of the Congress Committee was unanimously adopted. The list for the election of new members of the Congress Committee was discussed. Result of the elections is noted under item 21. The President thanked Prof. Olhoff for his precise report.

Item 7 – Adhering Organizations

(1) Bulgaria. The Bulgarian Academy of Sciences has applied for a change of membership from Category II to Category I to be reversed to 1992. This application was approved by acclamation.

(2) Croatia. The Croatian Society of Mechanics has applied for membership with IUTAM as an Adhering Organization in Category I. Subsequently to a statement presented by the invited observer Prof. Alifrić, and as a follow-up of the recommendation of the Bureau, the General Assembly has approved membership by acclamation.

(3) South Africa. The Foundation for Research Development (FRD) as the adhering organization with the South African Association for Theoretical and Applied Mechanics (SAAM) as the supporting professional body has applied for membership with IUTAM as an Adhering Organization in Category I. Subsequently to a statement presented by the invited observer Prof. Martin, and as a follow-up of the recommendation of the Bureau, the General Assembly has approved membership by acclamation.

(4) Ukraine. The National Academy of Sciences of Ukraine has applied for membership with IUTAM as an Adhering Organization in Category II. Prof. Guz was invited to attend the General Assembly as an observer. He is the Chairman of the Ukrainian National Committee that had applied earlier for membership of category I. Since a second application for membership of category I by the Society of Mechanical Engineering was also received, however with no further response, the Ukrainian Academy of Sciences decided to apply for membership of category II. That last application was
signed by the President of the Academy, and named Profs. Guz' and Pilipenko as the representatives. However, Prof. Guz' has not withdrawn the application he has signed in his capacity as the chairman of the national committee. Therefore, the General Assembly authorized the Bureau to accept the application of the Academy of Sciences for membership of category II if the national committee sends a letter of agreement to IUTAM. Therefore a decision in this matter is still pending since such a letter has not been received yet. In the lively discussion on these matters, Professor Karihaloo, who attended the International Congress of Fracture in Kiev, that is mentioned under ICF above, gave a strong point in favor of accepting the application since the Ukrainian Mechanics community is continuing with excellent work and deserves international recognition. Notes added: In the meantime all previous applications were withdrawn, a new application was forwarded and Ukraine is now adhering to IUTAM, membership became effective on 01/01/1995.

(5) Slovenia. The Slovene Mechanics Society has applied for membership with IUTAM as an Adhering Organization in Category I. The application was accepted by the General Assembly subject to the condition of providing the Statutes in English. The Statutes originally submitted with the application were provided in Slovenian only. In the meantime these Statutes have been received in English and the application became effective with the year 1994. Formation of a national committee for IUTAM within that Society in the meantime has been recommended by a letter written by the Secretary General.

Item 8 – Affiliated Organizations

(1) IABEM. The International Association of Boundary Element Methods (IABEM) has re-applied for membership with IUTAM. The founding president of IABEM Professor Cruse and the president of IACM, both gave a clear statement that IABEM never has been affiliated to IACM. With reference to that question raised at the General Assembly in Haifa and that clarification, the application for affiliation of IABEM to IUTAM was unanimously approved.

Discussions and decisions on the Items 8.2 to 10 were postponed to the meeting on Sunday. However, the order of the Agenda is kept in these minutes for convenience.

(2) Closer Cooperation with the following affiliated organizations IACM, ICR, ICM, ISIMM
IACM: Reports by Prof. de Arantes e Oliveira (member of IACM executive council) on the World Congress and the decisions taken there, and of Prof. Tatsumi on the joint meeting of the IACM council and the IUTAM delegates were warmly received by the General Assembly. Professor T. Oden (USA), former president of IACM was elected as a member of the Congress Committee of IUTAM. Plans for a joint congress in the year 2000 were not further discussed due to lack of time.
ICM: Professor Inoue, president of ICM was elected as a member of the Congress Committee of IUTAM.
ISIMM: Professor Hayes whose term as a member of the congress committee ends 1994 was elected to represent ISIMM in the congress committee of IUTAM.

(3) ESIS. The European Structural Integrity Society (ESIS) has applied for affiliation with IUTAM. Since affiliation also means joint symposia, the Bureau is asked by the General Assembly to clarify what restrictions in this respect are associated with the European based society. A decision is postponed to the next Assembly at Kyoto in 1996.

(4) International Institute of Acoustics & Vibrations. Sir James Lighthill reported on three international conferences, recently and successfully held, and with emphasis on the mechanical aspects of acoustics (complementary to the physical acoustics as represented by IUPAP), e.g., structure- and airborne noise is a main subject. The Institute has just been founded and relies on personal membership. An application for affiliation with IUTAM is welcomed by the General Assembly and may positively be handled by the Bureau. The application should be received within a six months period.

Item 9 – Inter-Union Committees and Commissions

The Chairman of the ICSU Special Committee for the International Decade for Natural Disaster Reduction (IDNDR), Sir James Lighthill, submitted a short report to the General Assembly: He mentioned the Interunion Commission of IUGG, IUTAM and WMO with the most important outcome of the Beijing Conference, namely the forecasting of storms and floods, the proceedings published by Beijing University Press. In 1993 major meetings were held in Mexico on hurricanes and global warming, reports were published. IUTAM brings in the advanced Mechanics that is needed for quantitative modeling, including eruptions of Volcanos. In the Lithosphere project a global seismic assessment is under development. A more elaborate report will be included in the Annual Report 1994.

Item 10 – Matters concerning Non-ICSU Organizations
There was nothing to report.

Item 11 –

11.1. Preliminary discussion on changes of Statutes

Professor Moffatt reports on the proposed changes printed in the Report 1993, pp. 79–80. A final decision on a slightly modified text is taken under
The General Assembly has rejected the idea brought forward at the Haifa meeting to increase the number of members of the Bureau: "In 1992 Professor S. Leibovich proposed to investigate the optimal structure of IUTAM. In particular, he suggested to enlarge the Bureau to 10 or 12 members. Professor R. Wang supported this proposal. It was agreed that the Bureau will reconsider its structure and a report will be delivered at the General Assembly meeting in 1994." The General Assembly adopted the following statement proposed by the Bureau: All decisions within IUTAM are taken by the General Assembly. The Bureau only exists as an executive body to execute the decisions of the General Assembly and to carry out work between its meetings (Article XI of the Statutes). So the Bureau has no authority of its own. Therefore, the only condition regarding size is that the Bureau should be able to carry out its work in the most efficient manner. Since this requires active interaction between members of the Bureau it was concluded that the Bureau should not grow larger than it is now.

11.2. Proposal of Electoral Committee

Professors P.G. Hodge (USA), I. Imai (Japan), F.I. Niordson (Denmark) and H. Zorski (Poland) have been proposed for election to the General Assembly. Chairman: L. van Wijngaarden (President). Election is reported under item 20.

Item 12 – Publication of Proceedings of IUTAM Symposia

Prof. F. Ziegler reported on the procedure which resulted in the draft agreement with Kluwer Academic Publisher. The General Assembly stands behind the obligatory publication of Proceedings of IUTAM Symposia. Having one official publisher assigned makes it necessary to restrict the trading of the brand name "IUTAM-Symposium on ...". The Bureau is asked to seek legal advice in these matters. Decisions are reported under item 18.

Item 13 – Preliminary discussion on future International Summer School on Mechanics

Following the procedure proposed by Professor Tabarrok and adopted at the General Assembly in Haifa, the proposals were submitted to the Symposia Panels for a rating. Two proposals have been received and thus transmitted. Both received an α-rating: 1) International Summer School (1995), Sweden, Topic - "Turbulence and Transition Modeling". 2) International Summer School (1997), India, Topic - "Optimum Dynamic Design Using Modal Testing and Structural Dynamic Modification". However, since the summer school of 1994 is on a similar topic further discussions were agreed on.

Final decisions are reported under item 16.

Item 14 – Preliminary discussion on future IUTAM Symposia

17 Proposals were received for 1996 and 14 were received for 1997. In addition to the written reports of the chairman of the Symposia Panels which were submitted together with the preparatory material to all members of the General Assembly, Professor Acrivos (Fluids Panel) and Professor Salençon (Solid Panel) addressed the General Assembly giving details of the ratings of five alphas for fluid and eight alphas for solid mechanics. With 12 symposia rated beta and the preliminary decision to select 18 for the two years period 1996/97, the general and lively discussion was opened.

Item 15 – Continued discussion and final decision regarding future IUTAM Symposia

From the 31 proposals the following 19 (one more over the proposed 18 was agreed on) were accepted by secret ballot by the General Assembly following an extensive discussion and taking into account the carefully prepared rating by the Symposia Panels: The Bureau in its third meeting on Monday 29 August 1994 decided on the Scientific Committees. For sake of convenience that decisions are reported at once. Numbering is tentative and will be changed according to the chronological order later when the dates are assigned. See also the forthcoming Newsletter N–19. Address corrections are requested at IUTAM office in Vienna.

The IUTAM-Treasurer has signaled the annual losses in budget. Professor D. Drucker suggests a reduction of the number of symposia to 12 bi-annually. The Bureau is asked for a proposal in that financial matter to be presented to the next General Assembly in Kyoto.

96-1 IUTAM Symposium on Variable Density Low Speed Turbulent Flows

| Place:   | France |
| Date:    | 1996   |
| Chairman:| Professor L. Fulachier |
|          | Institut de Mécanique Statistique de la Turbulence F–13003 Marseille, France |
|          | +33 91 08 16 37 |
|          | +33 91 50 54 39 |
|          | Professor J.L. Lumley |
|          | Sibley School of Mech. and Aerosp. Engnr. |
|          | Upson and Grumman Halls |
|          | Cornell University |
|          | Ithaca, NY 14853, USA |
|          | +1 607 255 12 22 |
96-2 IUTAM-CCFD Symposium on Lubricated Transport of Viscous Materials

Place: West Indies
Date: 1997 (year confirmed)
Chairmen: Professor D. D. Joseph
Department of Aerospace Engineering and Mechanics
University of Minnesota
Minneapolis, MN 55455, USA
Telefax: +1 612 626 1558
Dr. H. Ramkisson
Department of Mathematics & Computer Science
University of the West Indies
St. Augustine
Trinidad
West Indies
Telefax: +1 (809) 663-9684

96-4 IUTAM Symposium on Computational Methods for Unbounded Domains

Place: University of Colorado, USA
Date: 1997
Chairman: Prof. T.L. Geers
Center for Acoustics
Mechanics and Materials
University of Colorado
Boulder, CO-80309-0427, USA
Telefax: +1 303 492 2863

96-5 IUTAM Symposium on Interaction Between Dynamics And Control In Advanced Mechanical Systems

Place: Eindhoven University of Technology, The Netherlands
Date: 21 – 26 April 1996 (date confirmed)
Chairman: Prof. D.H. van Campen
Dept. of Mechanical Engineering
Eindhoven University of Technology
P.O. Box 513
NL-5600 MB Eindhoven, The Netherlands
Telefax: +31 40 447 355

96-9 IUTAM Symposium on Innovative Computational Methods for Fracture and Damage

Place: University College, Dublin, Ireland
Date: 30 June to 5 July 1996 (date confirmed)
Chairman: Dr. P.E. O'Donoghue
Dept. of Civil Engineering

96-10 IUTAM Symposium on Transformation Problems in Composite and Active Materials

Place: Cairo University, Egypt
Date: 1996
Chairmen: Professor Y.A. Bahei-El-Din
Structural Engineering Department
Cairo University
Giza, Egypt
Professor J.J. Dvorák
Dept. of Civil & Environmental Engineering
Jonsson Engineering Center
Rensselaer Polytechnic Institute
Troy, NY 21280-3590, USA
Telefax: +1 518 276 4833
Phone: +1 518 276 6340

96-12 IUTAM/IACM Symposium on Discretization Methods in Structural Mechanics II

Place: Technical University of Vienna, Austria
Date: 1997
Chairmen: Professor H.A. Mang
Professor for Strength of Materials
Karlsplatz 13/202
A-1040 Wien, Austria
Telefax: +43 1 5041629
Professor F.G. Rammerstorfer
Professor of Lightweight Structures
Gulhausestrasse 25-29
A-1040 Wien, Austria
Telefax: +43 1 5054468

96-13 IUTAM Symposium on Micro and Macrostructural Aspects of Thermoplasticity

Place: Bochum, Germany
Date: 1997
Chairmen: Prof. Dr. O.T. Bruhns
Institute of Mechanics
Ruhr-University Bochum
D-44780 Bochum, Germany
Telefax: +49 234 709 4229
Professor E. Stein
96-14 IUTAM Symposium on Simulation and identification of organized structures in flows

Place: Denmark
Date: 1997
Chairmen: Professor E.J. Hopfinger
Institut für Baumechanik und Numerische Mechanik
Universität Hannover
D-3000 Hannover 1
Germany
Telefax: +49 511 762 5496

96-15 IUTAM Symposium on Non-Linear Singularities In Deformation And Flow

Place: UK or Israel
Date: 1996
Chairmen: Professor D. Durban
Faculty of Aerospace Engineering
Technion – Israel Institute of Technology
Haifa 32000, Israel
Telefax: +972 4 231 848
Phone: +972 4 293 805
Professor J.R.A. Pearson
Scientific Advisor
Schlumberger Cambridge Research
Fluid Mechanics Department
High Cross, Madingley Road
Cambridge CB3 0EL, UK
Telefax: +44 223 315 486
Phone: +44 223 315 576

97-3 IUTAM Symposium on Rheology and Computation

Place: University of Sydney, Australia
Date: 1997
Chairman: Professor N. Phan-Thien
Dept. of Mech. & Mechatronic Eng.
University of Sydney
N.S.W. 2006, Australia
Telefax: +61 2 692 3760

97-4 IUTAM Symposium on Statistical Energy Analysis (SEA)

Place: University of Southampton, UK
Date: 1997
Chairmen: Professor F.J. Fahy
ISVR
University of Southampton
Highfield
Southampton SO17 1BJ, UK
Telefax: +44 703 593 299
Professor W.G. Price
Dept. of Ship Science
University of Southampton
Highfield
Southampton SO17 1BJ, UK

97-6 IUTAM Symposium on Rheology of Defective Body

Place: Beijing, China
Date: 2 – 6 September 1997
Chairman: Professor R. Wang
Dept. of Mechanics
Peking University
Beijing 100871, China
Telefax: +86 1 250 1826

97-7 IUTAM Symposium on Material Instabilities in Solids

Place: Delft University of Technology, The Netherlands
Date: 1996
Chairmen: Professor R. de Borst
Delft University of Technology
Faculty of Civil Engineering
P.O. Box 5048
NL-2600 GA Delft, The Netherlands
Telefax: +31 15 61 14 65
Professor E. van der Giessen
Delft University of Technology
Faculty of Mechanical Engineering and Marine Technology
P.O. Box 5048
NL-2600 GA Delft, The Netherlands
Telefax: +31 15 78 21 50

97-8 IUTAM Symposium on Viscoelastic Fluid Mechanics

Place: Stanford University, USA
Date: 1997
Chairman: Professor G.M. Homsy
School of Engineering
Stanford University
Stanford, CA 94305, USA
(Note added in proof: The chairman applied for postponing the Symposium
to June 1998)

97-10 IUTAM Symposium on New Applications of Nonlinear and Chaotic
Dynamics in Mechanics

Place: Cornell University, NY, USA
Date: 1997
Chairman: Professor F. Moon
Department of Mechanical
and Aerospace Engineering
204 Upson Hall
Cornell University
Ithaca, NY 14853, USA
Telefax: +1 607 255 1222

97-12 IUTAM Symposium on Variations of Domains and Free-Boundary
Problems

Place: Ecole Polytechnique, Paris, France
Date: 1997
Chairmen: Professor M. Frémond
Laboratoire des matériaux et des structures
du Génie Civil,
Cité Descartes, 2 Allée Képler
F-77420-Champs sur Marne, France
Telefax: +33 1 40435450
Professor Quoc Son Nguyen
Laboratoire de Mécanique des Solides
Ecole Polytechnique

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

F-91128-Palaiseau Cedex, France
Telefax: +33 1 69333026

97-13 IUTAM Symposium on Dynamics of Slender Vortices

Place: Aerodynamisches Institut, RWTH Aachen, Germany
Date: 1997
Chairmen: Professor K. Gersten
Institut für Thermo und Fluidmechanik
Ruhr-Universität
Bochum, Universitätsstr. 150 IB
D-44801 Bochum, Germany
Telefax: +49 234 709 4162
Professor E. Krause
Aerodynamisches Institut
RWTH Aachen
Wüllnerstr. zw. 5 u. 7
D-52062 Aachen, Germany
Telefax: +49 241 8888 257

The following proposals were not accepted for the period 1996/97:-

96-3 IUTAM Symposium on Tribological Investigations on Dynamically
Loaded Bearings
96-6 IUTAM Symposium on Identification and Control of Eddy
Structures in Turbulent Shear Flows
96-7 IUTAM Symposium on Elastic Wave Propagation
96-8 IUTAM Symposium on Mechanics of Solids Subject to
Microstructural Change and Damage
96-11 IUTAM Symposium on Turbulence and Inertia Effects in Fluid Film
Lubrication
96-17 IUTAM Symposium on Physics on Fluid Turbulence
97-1 IUTAM-ESIS Symposium on Short Crack Behavior Under Variable
Amplitude Fatigue Loading
97-2 IUTAM Symposium on Discontinuous Multibody Dynamics
97-5 IUTAM Symposium on Creep Crack Growth Of Brittle Materials
97-9 IUTAM Symposium on Instability in Solids: Effect of
Microstructure
97-11 IUTAM Symposium on Fatigue and Damage Mechanics
97-14 IUTAM Symposium on Control of Flow Instabilities and Unsteady
Flows

Item 16 – Continued discussion and final decision on International Summer
School on Mechanics

After hearing reports by Profs. Bianchi, Kaliszky and Schiehlen the
General Assembly agreed to continue the program of IUTAM Summer
Schools.

The IUTAM-ERCOFTAC Summer School on "Turbulence and Transition Modeling" was approved by the General Assembly to be held in 1995 in Sweden. In 1996, the year of the 19th ICTAM, no summer school will be on the program.

The IUTAM Summer School on "Optimum Dynamic Design Using Modal Testing and Structural Dynamic Modification" was accepted by the General Assembly to be organized in 1997 in India. Prof. Narasimha spoke in favor of that program.

Item 17 – Continued discussion and final decision on changes of Statutes
17.1 Article XV is an addition to the Statutes:

The General Assembly approved the following addition to the Statutes, to be included in the Report 1994:

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).

1) Article XV adopted by the General Assembly on August 28, 1994 in Amsterdam.

17.2 Alteration of the Procedure for election of the Bureau of IUTAM (p. 114, Report 1993)

The General Assembly adopted the following procedure for the forthcoming elections:

Procedure1 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 members of the GA, 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.

1) Procedure adopted by the General Assembly on August 28, 1994 in Amsterdam.

Item 18 – Continued discussion and final decision on Publication of Proceedings of IUTAM Symposia

The General Assembly agreed on the proposal by the Bureau of continuing the publication of Proceedings of all IUTAM-Symposia and on the designation of Kluwer Academic Publishers as the official IUTAM publisher of that Proceedings, based on the following updated drafts of conditions and agreements. The latter are subject to screening by a lawyer and the Bureau is asked to seek that legal advice. The General Assembly finally entrusted the Bureau of signing such a screened and possibly revised contract.

DRAFT STANDARD CONDITIONS FOR PUBLICATION OF IUTAM PROCEEDINGS

1. There will be no royalties.
2. Kluwer will provide the Editor(s) of a given volume with 20 free copies (total) of the volume.
3. Kluwer will provide the IUTAM bureau with 10 free copies.
4. Kluwer will provide either directly, or via the Editor(s) of a given IUTAM volume, guidelines and instructions to contributing authors so as to ensure that each contribution appearing in IUTAM proceedings volumes is prepared in camera-ready form to a consistent style and format. Kluwer is able to provide contributors with a \LaTeX\ stylefile if this is required. Otherwise contributors may use other software environments. Kluwer is happy to provide any necessary advice to contributors in this respect.

5. The cost of the volume at a special price will be incorporated into the registration fee so that each registered participant will automatically receive a copy upon publication. The special price includes tax (if applicable) and postage.

6. The special price will depend on the number of participants and the size of the volume and will be the subject of negotiation between Kluwer and the Editor(s) of a given volume. In any event, the special price to participants will not exceed Dfl. 140 (currently $75) irrespective of number of pages or number of participants. Should inflation or costs increase appreciably this maximum will be subject to appraisal.

7. It will be the sole responsibility of the organizers of a given Symposium to Forward to Kluwer the appropriate payment.

8. Kluwer will provide the organizers of a given Symposium with a subsidy of Dfl. 1,000 (one thousand guilders) towards the cost of organizing the Symposium of upon signing the contract.

9. Should Kluwer decide to send a representative to a given meeting, the organizers will agree to provide display space free of charge for the display of relevant publications and, possibly, the dissemination of relevant promotional material to participants in the conference portfolios.

DRAFT AGREEMENT
by and between IUTAM and Kluwer Academic Publishers

1. It is agreed that Kluwer Academic Publishers is the official designated publisher of the proceedings of IUTAM Symposia as from January 1, 1996.

2. IUTAM will inform the organizers of IUTAM Symposia that they should contact Kluwer with regard to the publication of the IUTAM Symposium proceedings.

3. The terms and conditions relating to the publication of a given IUTAM proceedings volume will be a matter for negotiation based on the IUTAM-Kluwer Standard Conditions between the organizers of the Symposium (the Editors of a given volume) and Kluwer, and, in each case, will be bound by a separate agreement between these two parties. The basic proposed conditions for individual publication agreements are listed in the Standard Conditions.

4. The scientific content of a given volume will be solely the responsibility of the Scientific Committee and Kluwer will be responsible for ensuring that the respective volumes are produced to a high quality in a consistent style and format. The chairmen of the Scientific Committee serve as the Editors of that volume.

5. The brand name "IUTAM Symposium on" will be an integral part of the title page and the front and back cover of each respective volume, and will feature in relevant promotional material.

6. Providing it is appropriate vis-à-vis subject matter, IUTAM proceedings volumes will be published in the "Solid Mechanics and its Applications" book series or the "Fluid Mechanics and its Applications" book series published by Kluwer. In those cases where this is not appropriate, the IUTAM proceedings will be published out of series in the same style and format.

7. Each IUTAM proceedings will be published in hard cover.

8. Kluwer will provide free of charge to the IUTAM Bureau 10 copies of each IUTAM proceedings volume published.

9. This agreement will remain in force for an initial period of 5 (five) years, and 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 5-year period or subsequent 3-year periods.

Both editors of the Series on Solid and Fluid Mechanics, Professors Gladwell and Moreau, have agreed to function only on technical matters and heartily welcomed the refereed Proceedings of the forthcoming IUTAM Symposia. The ex-officio member in the Scientific Committee should resume the additional duty to help the Chairman (the Editor) and also to consider the quality of publication of the proceedings. In the meantime several chairmen of IUTAM-Symposia selected Kluwer as the Publisher of the Symposium Proceedings and their positive editorial experience is to be noted.

Item 19 – Continued discussion and final decision regarding annual dues

The Bureau is asked to look into the financial developments and to find means to stabilize the budget. Following the proposal made by the Treasurer, Professor B.A. Boley, see Items 3 and 4, the General Assembly decided the following amounts for the units of dues:

\[
\begin{align*}
537 \text{ US$} & \quad \text{in 1996}, \\
565 \text{ US$} & \quad \text{in 1997},
\end{align*}
\]

or 551 US$ for 1996 and 1997 for those members who prefer to pay equal amounts in each of these two years.

Item 20 – Election of members of the Electoral Committee

The General Assembly elected Professors P.G. Hodge (USA), I. Imai (Japan), F.L. Niorosd (Denmark) and H. Zorski (Poland) as members of the Electoral Committee. Chairman is Prof. L. van Wijngaarden (President).
Item 21 – Election of members of the Congress Committee of IUTAM

Following the recommendations of the Congress Committee, the General Assembly elected (i)-(ii)
(i) Profs. Acrivos, Calladine, Cercignani, Hayes, representative of ISIMM, Kaliszyk, Schiehlen, Ren Wang and Ziegler, i.e. their reappointment for the term 1994-1998
(ii) Profs. T. Inoue (Japan), representative of ICM; J. Jimenez (Spain); B.L. Karihaloo (Australia); B.C. Nakra (India); J.T. Oden (USA), representative of IACM, as new members;
(iii) The General Assembly elected Prof. A.N. Kounadis (Greece) as a new member of the Congress Committee.

The President recorded his thanks to the following for their devoted service to the Congress Committee: Profs. J.D. Achenbach (USA), A. Crespo (Spain), J. Lemaître (France), R. Narasimha (India) and Dr. J.R. Philip (Australia). The new membership of the Congress Committee is recorded in the following table:

**Members of the Congress Committee**

- Prof. A. Acrivos (USA) 1998
- Prof. H. Aref (USA) 1996
- Prof. S.R. Bodner (Israel) 1996
- Prof. B.A. Boley (USA) 1996
- Prof. C.R. Calladine (UK) 1998
- Prof. C. Cercignani (Italy) 1998
- Prof. G.G. Chernyi (Russia) 1996
- Prof. J. Engelbrecht (Estonia) 1996
- Prof. P. Germain (France) 1996
- Prof. Z. Hashin (Israel) 1996
- Prof. M.A. Hayes (Ireland) 1998, Rep. of ISIMM
- Prof. N.J. Hoff (USA)
- Prof. J. W. Hutchinson (USA) 1996
- Prof. T. Inoue (Japan) 1998, Rep. of ICM
- Prof. J. Jimenez (Spain) 1998
- Prof. S. Kaliszyk (Hungary) 1998
- Prof. B.L. Karihaloo (Australia) 1998
- Prof. A.N. Kounadis (Greece) 1998
- Prof. Y.H. Ku (USA)
- Prof. S. Leibovich (USA) 1996
- Prof. B. Lundberg (Sweden) 1996
- Prof. G.E.A. Meier (Germany) 1996
- Prof. H.K. Moffatt (UK) 1996
- Prof. Z. Mroz (Poland) 1996
- Prof. B.C. Nakra (India) 1998

- Prof. J.T. Oden (USA) 1998, Rep. of IACM
- Prof. N. Olhoff (Denmark) 1996, Secretary
- Prof. T.J. Pedley (UK) 1996
- Prof. M. Sayir (Switzerland) 1996
- Prof. W. Schiehlen (Germany) 1998
- Prof. B. Tabarrok (Canada) 1996
- Prof. T. Tatsumi (Japan) 1996
- Prof. Ren Wang (China) 1998
- Prof. L. van Wijngaarden (The Netherlands) 1996, Chairman
- Prof. Z.M. Zheng (China) 1996
- Prof. F. Ziegler (Austria) 1998

* Members of Executive Committee (1992-1996)
* Year, where stated, indicates end of term (applies to members elected after 1973).

Item 22 – Election of members of Symposia Panels

The members of the two panels have been elected for the period 1992-1996 as reported in the annual report 1993, p. 18. The Panels thus remain unchanged:

**Fluid Mechanics**

- Prof. A. Acrivos (USA), Chairman
- Prof. K. Gersten (Germany)
- Prof. H.K. Moffatt (UK)
- Prof. R. Narasimha (India)
- Prof. T. Tatsumi (Japan)

**Solid Mechanics**

- Prof. J. Salençon (France), Chairman
- Prof. J.D. Achenbach (USA)
- Prof. G. Maier (Italy)
- Prof. K. Sobczyk (Poland)
- Prof. B. Storaekers (Sweden)

Item 23 – Election of Members-At-Large

All elected members and members-at-large of the General Assembly were reelected for the period 1994 through 1996.

Item 24 – Date and venue of the next General Assembly

On invitation by Professor T. Tatsumi, Congress President, the General Assembly decided to hold its next meeting on 28 and 29 August 1996 during the 19th ICTAM at Kyoto, Japan.

Item 25 – Any other business

The untimely death of Professor Paul M. Naghdi was reported to the General Assembly.

Then, the President closed the meeting at 18.05 hours.

**Franz Ziegler, Secretary-General**

Date and venue of the next Bureau meeting

The Bureau of IUTAM will hold its next meeting on Sunday, 10 September 1995 and on Monday, 11 September 1995 at the Technical University of Vienna, in Vienna, Austria hosted by the Institute f. Allgemeine Mechanik, (head: F. Ziegler).
Report

on

International Centre for Mechanical Sciences (CISM)

1. Courses and Seminars

The regular program of courses and seminars planned for the Centre for the year 1994 by the Scientific Council, took place in the two Scientific Sessions, the Rayleigh Session (May-July, 1994) and the Sawczuk Session (September-October, 1994). The topics, always at an advanced level, included different fields of mechanics and related computer sciences, both at a basic and applied level. Some courses and seminars were sponsored by UNESCO and CNR (National Research Council of Italy).

The Rayleigh Session

- Eddy Structures Identification Techniques for Free Turbulent Flows
- Summation Theorems and their Applications to the Theory of Structural Stability
- Biomechanical Aspects of Artificial Joints
- Mechanics of Musical Instruments

The Sawczuk Session

- Crack and Contact Problems for Viscoelastic Bodies
- Polymer Mechanics: Conditions of Solidification and Ageing
- Modern Issues in Non-Saturated Soils
- Steel Plated Structures
- Protection of the Architectural Heritage against Earthquakes

2. Various International Events

Besides the above courses the following other international meetings were organized by CISM in 1994:

- Symposium on “Advanced Methods for Groundwater Pollution Control” (May 5-6), organized jointly with the Friuli-Venezia Giulia Region Civil Defence
- “Kinematics and Dynamics of Multibody Mechanical Systems” (July 11-15)
  Advanced School addressed to professionals active in research, development and design of mechanical systems at large
- CISM-IFToMM Symposium on “Theory and Practice of Robot and Manipulators” (Gdansk, September 12-15), organized jointly with the International Centre for Mechanical Sciences (CISM) and the International Federation for the Theory of Machines and Mechanisms (IFToMM). The following topics were treated:

- Advanced School on “Typed Lambda Calculus and Functional Programming” (September 19-30), organized within the UNESCO project “Applied Informatics, and Mathematics in Developing Countries”

3. Editorial activities

The lectures of several of the courses held at CISM are published in book form and distributed by Springer Verlag, Vienna - New York.

The following books were published in 1994:

E. Kreuzer: “Computerized Symbolic Manipulation in Mechanics”
T.T. Soong: “Passive and Active Structural Control in Civil Engineering”
J. Paredaens - L. Tenenbaul: “Advances in Database Systems, Implementations and Applications”
F. Cap: “Waves and Instabilities in Plasmas”
G. Diana: “Diagnostics of Rotating Machines in Power Plants”
M.H. Alabadi - C.A. Brebbia - V.Z. Parton: “Static and Dynamic Fracture Mechanics”


4. Scholarships

A limited number of scholarships, including free lodging and board, 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. Travel expenses as
well as board and lodging of participants from developing countries have been covered by UNESCO contribution.

5. International Participation

In 1994, more than 100 lecturers from 15 countries delivered lectures in the Rayleigh Session and Sawczuk Session. The two Sessions were attended by 420 participants from 39 countries.

G. Bianchi

Report

on

International Committee on Rheology (ICR)

The most significant activity associated with the ICR has been the ongoing work by the Canadian Rheology Group to host the next International Congress. The Congress will be held in Quebec City, Canada, August 18-23, 1996. About 500 rheologists are expected to attend the Congress, which is held every four years. The Chairman of the Organizing Committee is Professor Daniel Dekeee, Université de Sherbrooke. The Secretary of the Congress, and the person from whom further details may be obtained, is Dr. Michel Dumoulin, National Research Council - Canada, Industrial Materials Institute, 75 de Mortagne, Boucherville (Quebec), Canada J4B 6Y4.

David F. James

Report

on

EUROMECH—European Mechanics Society

During 1994 fourteen EUROMECH Colloquia and three EUROMECH Conferences were organized.

EUROMECH Colloquia:

EUROMECH 315, 7-9 March 1994, Erlangen, Germany: Efficient numerical methods and parallel computing in fluid mechanics

EUROMECH 316, 11-14 April 1994, Manchester, England: Advanced techniques in structural acoustics

EUROMECH 317, 21-23 March 1994, Liverpool, England: Buckling strength of imperfection-sensitive shells

EUROMECH 318, 1-3 June 1994, Prague, Czech Republic: Stability and vibrations of mechatronic systems

EUROMECH 319, 17-20 May 1994, Tallinn, Estonia: Theoretical and experimental aspects of particle-laden flows

EUROMECH 320, 6-8 June 1994, Prague, Czech Republic: Multibody systems: Advanced algorithms and software tools

EUROMECH 321, 23-27 May 1994, Udine, Italy: Microstructure and phase transitions in solids

EUROMECH 322, 22-23 June 1994, Riksgränsen, Sweden: Cracks in coated and layered materials

EUROMECH 323, 4-7 July 1994, University of East Anglia, England: Reaction-diffusion phenomena in physical and chemical systems

EUROMECH 324, 25-27 July 1994, Marseille, France: The combustion of drops, sprays and aerosols

EUROMECH 325, 19-23 September 1994, L'Aquila, Italy: Bifurcation and chaos in solid and structural dynamics

EUROMECH 326, 26-28 September 1994, Kielce, Poland: Experiment and macroscopic theory in crack propagation

EUROMECH 327, 24-26 August 1994, Black Sea, Ukraine: Effects of organized vortex motion on heat and mass transfer

EUROMECH 328, 4-6 October 1994, Berlin, Germany: Management and active control of turbulent shear flows

EUROMECH Conferences:

5th European Turbulence Conference, 5-8 July 1994, Sienna, Italy

2nd European Solid Mechanics Conference, 12-16 September 1994, Genova, Italy

2nd European Fluid Mechanics Conference, 20-24 September 1994, Warsaw, Poland

Bengt Lundberg
Report

on

International Association for Vehicle System Dynamics (IAVSD)

A new Board of Trustees was elected in 1994 by voting among the members. The new Board has elected its officers as follows: H.B. Pacejka (President); W. Kortuem (1st Vice President); J.K. Hedrick (2nd Vice President); R.J. Anderson (Treasurer); R.S. Sharp (Secretary General). Other Board Members are: M. Abe; J. Elkins; P. Lugner; K. Knothe; J-P Pascal; G. Sauvage; H. True; and A.H. Wickens. W. Schiehlen remains as IUTAM representative on the Board.

The 3rd IAVSD Herbertov workshop meeting had as its theme "Interaction of railway vehicles with the track and its substructure" and it followed the format of the previous ones. The organisers of the meeting were K. Knothe (TU Berlin), S.L. Grassie (Consultant) and J.A. Elkins (Association of American Railroads). It met the same immediate objectives as previous workshop meetings in Herbertov had done, in that tremendous energy and enthusiasm were applied to the study topic over the period 19-23 September, 1994 and the delegates thoroughly enjoyed their experiences. Once again, IAVSD is indebted to the Czech Technical University in Prague, and to Professor M. Apetatur in particular, for enabling and supporting the meeting.

In addition to paper presentations and discussions, two benchmark problems were formulated, one for high frequency, the other for low frequency vibrations. Approximately 10 and 6 participants respectively are participating in these benchmarking studies.


The journal, Vehicle System Dynamics, continues to prosper under the editorship of P. Lugner and J.K. Hedrick. Special issues on Intelligent Vehicle Highway Systems have been introduced.

Preparations for the 14th IAVSD Symposium, to be held at The University of Michigan in Ann Arbor on 21-25 August, 1995, under the Chairmanship of Professor L. Segel, are well advanced. The Scientific Committee members are: M. Abe (Japan), R.J. Anderson (Canada), J. Aurell (Sweden), D. Cebon and D.A. Crolla (UK), J.A. Elkins and P.S. Fancher (USA), T.
The congress activities from 1991 to 1994 are as follows:

1. **Formal Decision on the Publishing Policy of ICM–7 by postal ballots**
   The organizer of ICM–7, Prof. A. Bakker, made a proposal that only extended abstracts will be published, and that full papers will be submitted to special issues of some journals, which are different from the traditional way in publishing policy of the Proceedings of the ICM Conferences. This was agreed by the postal ballots among the members of the Executive Committee.

2. **Discussions and determinations of the organizer and location of the next Conference on Mechanical Behaviour of Materials, ICM–8**
   Discussions have been carried out via mail, faxes, and e-mail on the proposal of the organizer and location of the next Conference, ICM–8. There were several proposals regarding locations, e.g. Canada, Australia, West Coast of USA, Hawaii, Southern Europe (Spain, Portugal, Italy) etc. Informal discussions were carried out via mail between the proposers and the president, and only one candidate is being considered, which will be discussed and finalized during the meeting of the Board of Governors in May, 1995.

3. **Activities related to IUTAM**
   Prof. T. Inoue, President of ICM, has been nominated as the member of the Executive Committee, IUTAM, from 1994 substituting Prof. K.J. Miller, a former ICM President. The duty of the member is to discuss the general affairs of IUTAM, including the yearly proposals of IUTAM Symposia and the 19th ICTAM 1996 to be held in Kyoto, Japan in 1996.

4. **Activities related to other conferences and symposia**
   Some applications are expected to arrive at the organization, which will have bids that conferences or symposia are desirable to cooperate with ICM. When the formal applications arrive, the decisions will be made as to whether or not such a cooperation is worth accepting.

5. **Further oriented activities**
   The body, ICM, was organized principally for holding the International Conferences to be held every four years. However, ICM will act as the body which is ready to cooperate with other bodies on the activities of the development of mechanical behaviour of materials.

T. Inoue

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**Affiliated national associations**

New affiliated associations are:

- The Israel Association of Computational Methods in Mechanics
- The Portuguese Society of Theoretical and Computational Mechanics
- Australian Association of Computational Mechanics
- South African Association for Theoretical and Applied Mechanics (SAAM)

Together with earlier affiliated national associations there are now groups in 30 countries affiliated to IACM. The main activity in IACM takes place in these national or regional associations.

**World Congresses**

The Third World Congress on Computational Mechanics took place in Chiba outside Tokyo in August 1994. It was successfully organized and run by the Japan Chapter of IACM chaired by Prof. T. Kawai. It had 3 Plenary Lectures, 48 Keynote Lectures and 40 Organized Sessions. The number of participants was about 900.

At the Congress the IACM Newton-Gauss medal was awarded to J. T. Oden. (It has earlier been awarded to R. Clough, J. Argyris, O.C. Zienkiewicz and R. H. Gallagher).

New members of the General and Executive Councils were elected. New Officers are A. Samuelsson (Sweden) President, T.J.R. Hughes (U.S.A.) Vice President (Americas), Y.K. Cheung (Hong Kong) Vice President (Asia-Australia), E. Ofiate (Spain) Secretary/Treasurer.

Next Congress is planned to Buenos Aires in 1998. The organization will be shared by the Asociacion Argentina de Mecanica Computacional and the International Center for Numerical Methods in Engineering at Barcelona, Spain. The Organizing Committee is chaired by S.R. Iadelsohn (Argentina) and E. Ofiate (Spain).

Alf Samuelsson
dynamic interactions in solids, ground water flows, transonic fluids, and
many more. The Symposium authors come from over 20 countries. The
meeting is being held in conjunction with the International Conference
on Computational Engineering Science (ICES) meeting.

The IABEM is also co-sponsoring the IUTAM/IABEM Symposium on
Boundary Integral Methods for Nonlinear Problems which will be held
from 28 May to 3 June in Siena Italy. The IABEM Scientific Committee for
this meeting is headed by Professor L. Morino (Italy) and Professor W.
Wendland (Germany).

A joint symposium co-sponsored with the American Society of Mechanical
Engineers is now scheduled for June of 1996. Prof. J. Rencis (USA) is the
organizer for this Symposium.

The IABEM is now initiating an effort to put its organization on the Internet
using the World Wide Web (WWW) facilities. The WWW-based access will
include the membership roster, newsletter items, research in progress
reports, technical discussions, and other items that are not yet thought of.
We expect to be "on-line" with this new service by the middle of 1995. The
goal is to use the WWW as the sole means of organizational communication
for the IABEM.

T. A. Cruse

Report
on
The International Association for Boundary Element Methods
(IABEM)

The IABEM reorganized its executive committee this past year to streamline
the Association activities and provide for greater continuity. The current
members of the executive committee are Prof. H. Antes (Germany), Prof.
S.N. Atluri (USA), Prof. D.E. Beskos (Greece), Prof. T.A. Cruse (USA),
Prof. S. Kobayashi (Japan), Prof. G. Maier (Italy), Prof. L. Morino (Italy),
Prof. C. Polizzotto (Italy), Prof. N. Tosaka (Japan), Prof. F.J. Rizzo
(USA), and Prof. W. Wendland (Germany). Prof. Maier is the IABEM
liaison to the IACM and Prof. Polizzotto is the IABEM member of the
IUTAM General Assembly. Prof. J. Berger is the IABEM Secretary. The
incoming president of the IABEM is Professor T. Cruse (USA).

The annual meeting and symposium on boundary element methods advances
is scheduled for July 30 to August 3, this year on the big island of Hawaii.
The meeting features over 80 papers on a diverse set of BEM subjects,
including non-singular formulations, inverse problems, fracture mechanics,
duplication of the extensive data activities of several of the Unions is to be avoided. To the extent that conceptual information can be included under "data", CODATA’s mission will be of interest to all who do research or use the results of research.

Daniel C. Drucker

**Report**

on

The Activities of the Committee on Space Research (COSPAR)

The Thirtieth Scientific Assembly of COSPAR was held in Hamburg, Germany, 11th to 21st July 1994. There were approximately 1,700 participants. The Council of COSPAR met on 11th and 21st July 1994. The Council accepted two resolutions, the first concerning Mars planetary protection policy (seeking to encourage further studies, exploration, and in particular the search for life); and the second (from the Panel on Space Research in Developing Countries) concerning support for programs and activities involving ground-based and space techniques, particularly those related to global and regional change studies, and recommending increased participation of scientists from developing countries in these programs.

The date and location of the 1996 COSPAR Scientific Assembly was confirmed: 14th to 20th July 1996 at the University of Birmingham, UK.

Two proposals for COSPAR Colloquia were approved:

- Space remote sensing of sub-tropical oceans, 12th to 16th September 1995, Taiwan.

- Magnetospheric research with advanced techniques, March 1996, Beijing, China.

New Officers and Bureau of COSPAR were elected by the Council. The new President is Dr. G. Haerendel (Germany) and the new Vice-Presidents are Professor L.J. Lanzerotti and Professor A. Nishida.

Further information concerning current COSPAR activities is contained in the COSPAR Information Bulletin No. 131, published in December 1994.

H.K. Moffatt

**Report**

on

Committee on Science and Technology in Developing Countries/International Biosciences Networks (COSTED/IBN)

There has been no well defined plan of cooperation between IUTAM and COSTED/IBN. During 1994 COSTED distributed over 2000 copies of a Handbook entitled "Activities of ICSU Bodies for Developing Countries" which contains information of IUTAM as one of the ICSU bodies.

The Scientific Secretary of COSTED/IBN, Prof. R.R. Daniel, is in the process of identifying some ICSU unions with which COSTED/IBN can cooperate profitably; IUTAM is one such union, as it is felt that mechanics can be a useful tool in a variety of applications of interest to developing countries. Professor Daniel has promised to send some specific suggestions regarding such applications in the near future, and I expect to continue my dialogue on the subject.

Roddam Narasimha

**Report**

on

International Commission on Acoustics

A meeting of the Commission was held in Trondheim during 1-2 July 1994 with, as its main Agenda item, the organization of the 15th International Congress of Acoustics (Polytechnic Institute, Trondheim, Norway, 26-30 June, 1995). Plenary lectures will be given in two parallel sessions, with contributed papers distributed among a much larger number of parallel sessions.

Next, some preliminary consideration was given to the organization of the 16th Congress (Seattle 1998) and of the 17th Congress (Rome 2001). Finally, the Commission agreed to co-sponsor three IUPAP meetings during 1995: on Musical Acoustics (Paris), on Acoustic Holography (Florence), and on Utilisation of Ultrasonic Methods in Condensed Matter (Zilina, Slovak Republic).

J. Lighthill
Report
on
Scientific Committee On Oceanic Research (SCOR)

1. SCOR held its 22nd General Meeting at Sidney, British Columbia, Canada, 17-21 October 1994.

2. SCOR Working Groups of particular interest to IUTAM:-

2.1 Past Working Groups.
WG 83 'Wave modelling'
The final report is now in press in the Cambridge University Press.

2.2 Current Working Groups.
WG 89 'Sea level and erosion of the World's coastlines'
The final report is expected in 1995.
WG 96 'Acoustic monitoring of the World Ocean'
Preliminary work in developing the international program on Acoustic Thermometry of Ocean Climate (ATOC), widescale temperature monitoring using low frequency acoustic propagation to infer temperature changes, is almost complete. Short transmission experiments have been carried out in the Arctic and from Hurd Island in the Southern Ocean. The program is awaiting decisions relating to the environmental impact of the sound generation on marine mammals.
WG101 'Influence of sea state on the atmospheric drag coefficient'.
The second meeting was held in late 1994. The final meeting and a workshop are being planned for 1996.
WG 103 'The role of wave breaking on upper ocean dynamics'
This has so far worked by correspondence. It will next meet in Heidelberg, 22-23 July '95, in association with a meeting on Air-Sea Gas Transfer.

2.3 New Working Groups under consideration.
(i) Double Diffusion
(ii) Coupled Ocean Circulation and Ecosystem Development in Models

3. Global Monitoring and Observing Systems:-

An international organization under IOC, WMO, ICSU and SCOR, 'J-GOOS' (Joint Global Ocean Observing System), has been established, responsible for the joint scientific and technical development of GOOS. The Chairman is yet to be appointed. The development of GOOS is likely to have far-reaching consequences for observational and applied oceanography, and in the provision of marine operational and prediction services.

S.A. Thorpe
ART. 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.

ART. VI
L’Assemblée Générale se compose:
a) des représentants des «organisations adhérentes» (cf. art. VIII);
b) des membres du Bureau (cf. art. XI);
c) des membres par l’Assemblée Générale de l’Union coopètes;
d) s’il y a lieu, et sur décision de l’Assemblée Générale, des représentants de
comités ou groupes d’hommes de science.
La durée de fonction de tout membre élu doit être précisée, lors de son
election, par l’Assemblée Générale. La durée de fonction des membres du
Bureau doit coïncider avec celle de leur fonction au Bureau.

ART. VII
L’Assemblée Générale doit tendre à une représentation adéquate de tout
groupe d’hommes de science poursuivant des recherches en mécanique
thorique ou appliquée et non représentés par une organisation adhérente.

ART. VIII
Les organisations d’hommes de science 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 exclut 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.

1) Adoptés par l’Assemblée Générale de l’Union le 2 September 1990 à Vienne (l’Autriche)

ART. 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).

ART. 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 réciprocement la faculté de désigner un
observateur, sans droit de vote, au Conseil Scientifique ou à l’organe
equivalent de l’organisation affiliée.
L’organisation affiliée et l’Union sont tenues de s’informer mutuellement de
ses 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.

ART. XI
Pour exécuter les décisions de l’Assemblée Générale et pour assurer entre
ses séances 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, les Président qui remplit la
fonction de Vice-Président, un Secrétaire Général et un Trésorier) et de
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 être recevoir
plus de deux mandats consécutifs. Les membres du Bureau nouvellement élus
entrent en fonction au 1er novembre qui suit l’Assemblée Générale qui a
procédé à leur élection.
Le Bureau doit se réunir au moins une fois par an. Tout membre du Bureau
empêché de prendre part à une réunion de celui-ci peut désigner par lettre
adressée au Secrétaire Général un autre membre de l’Assemblée Générale
pour le remplacer à cette session.

Le Secrétaire Général centralise 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 peuvent être désignés en dehors des membres du Bureau mais parmi les membres de l'Assemblée Générale.

Le Bureau doit dresser un budget prévisionnel pour l'année à venir, administrer les finances de l'Union et soumettre à l'Assemblée Générale un rapport financier annuel.

Le Vice-Président remplit 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.

ART. XII

L’Assemblée Générale désigne un Comité permanent des Congrès chargé de l’organisation à intervalles réguliers des Congrès Internationaux de Mécanique Théorique et Appliquée.

a) Le Président de l’Union préside aussi ce Comité des Congrès.

b) Les Membres de ce Comité sont élus par l’Assemblée Générale, ce sont des hommes de science actifs dans le domaine de la mécanique théorique ou appliquée, n’appartenant pas nécessairement à l’Assemblée Générale.

c) Le Comité des Congrès élit ou réélit, pour une durée qu’il juge convenable, son Secrétaire Général.


ART. 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 fait bénéficier l’Union de donations, legs ou subventions.

ART. XIV

Le nombre des représentants d’une «organisation adhérente» et le montant de la cotisation annuelle qu’elle doit acquitter sont déterminés, selon le tableau suivant, par la catégorie à laquelle désire appartenir l’organisation, après accord de l’Assemblée Générale.

Le montant de l’unité de cotisation annuelle est fixé par l’Assemblée Générale, au moins une année avant celle à laquelle cette cotisation devient exigible.

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 peut instituer un Comité Exécutif chargé de prendre en son nom toutes les décisions nécessaires pendant la période qui s’écoule entre deux Congrès successifs, et de lui en faire rapport à sa prochaine réunion. Le Comité Exécutif comprend le président et 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 où 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 (GA) précédant celle au cours de laquelle le nouveau Bureau doit être élu, un Comité électoral (EC) doit être élu comprenant le Président de l'IUTAM (qui assure la présidence de ce Comité) et deux à quatre membres de l'Assemblée GA, non membres du Bureau en exercice.

2. A la suite de cette élection, le Comité EC doit inviter les membres de la GA 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 Comité BC.

3. Prenant en compte toutes les suggestions reçues, le Comité BC 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 Comité EC 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'Assemblée GA avant la première session de l'Assemblée générale au cours de laquelle le nouveau Bureau doit être élu.


5. Avant la seconde session de l'Assemblée GA 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'Assemblée GA 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.

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 (theoretical or experimental) in mechanics or in related sciences;
b) to organize international congresses of theoretical and applied mechanics through a standing Congress Committee (Article XII), and to organize other international meetings for subjects falling within the field of theoretical and applied mechanics;
c) to engage in other activities meant to promote development of mechanics, both theoretical and applied, as a branch of science.

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.

VII
The General Assembly is composed of
a) representatives of the adhering organizations (Article VIII);
b) members of the Bureau (Article XI);
c) members-at-large;
d) representatives of committees and groups of scientists, if so decided by the General Assembly.
The term of an elected member 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.

VIII
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.

IX
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.

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.

1) Adopted by the General Assembly on September 2, 1990 in Vienna (Austria)
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 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.

To execute the decisions of the General Assembly and to carry out work between meetings, the General Assembly elects members of a Bureau for a period of at most four years. The Bureau consists of the officers (President, the retiring President who serves as Vice-President, Secretary-General, and Treasurer) and four other persons who shall have been members of the General Assembly at some time within the four years preceding the time of election to the Bureau. The maximum continuous period of service as a member of the Bureau, other than an officer, is limited to eight years.

Newly elected members of the Bureau enter into office on the date of November 1, following the General Assembly at which they were elected. The Bureau will meet at least every year. A member of the Bureau who is prevented from attending a meeting may by letter to the Secretary-General designate another member of the General Assembly as a replacement.

The Secretary-General will act as a permanent center for all matters affecting the Union, including relations with adhering, affiliated and other organizations.

The legal domicile of the Union shall be the place where the Secretary-General lives.

The Bureau is authorized to appoint Assistant-Treasurers in those countries where the Union has a bank account.

The Assistant-Treasurers must be members of the General Assembly but need not to be members of the Bureau.

The Bureau shall draft a budget for each coming year, and shall administer the finances. The Bureau shall submit an annual financial report to the General Assembly.

1) Adopted by the General Assembly on September 2, 1990 in Vienna (Austria)

The Vice-President shall normally fulfill the duties of the President should the President become unable to discharge them.

Between meetings of the General Assembly the Bureau shall decide who shall undertake the duties of the Vice President, Secretary-General, or Treasurer should a temporary replacement be necessary.

The General Assembly establishes a standing Congress Committee which is responsible for the organization of International Congresses of Theoretical and Applied Mechanics at regular intervals.

a) The President of the Union shall also serve as President of the Congress Committee.

b) The members of the Congress Committee are appointed by the General Assembly as scientists active in theoretical or applied mechanics and need not be members of the General Assembly.

c) The Congress Committee appoints a Secretary, without stated terms of office.

d) The rules of procedure of the Congress Committee shall be approved by the General Assembly.

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.

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:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of representatives</th>
<th>Units of annual subscription</th>
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<tr>
<td>I</td>
<td>1</td>
<td>1</td>
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<td>II</td>
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<td>8</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

Changes in the amount of the unit annual subscription will be decided by the General Assembly not less than one year in advance.
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).  

1) Article XV adopted by the General Assembly on August 28, 1994 in Amsterdam.

**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 members of the GA, 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.

1) Procedure adopted by the General Assembly on August 28, 1994 in Amsterdam.
Procedure for electing Members-at-Large of the General Assembly

1. This procedure shall apply for the election an 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.

1) Procedure adopted by the General Assembly on 26 August 1992 in Haifa, Israel

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.
55-1 Colloquium on Fatigue, (Stockholm, Sweden, 25-27 May 1955), organized by IUTAM. Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1956.

55-2 Colloquium on Deformation and Flow of Solids, (Madrid, Spain, 26-30 September 1955), organized by IUTAM. Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1956.

57-1 Third Symposium on Cosmical Gas Dynamics, (Cambridge, Massachusetts, USA, 24-29 June 1957, in cooperation with IAU). Published by Reviews of Modern Physics, American Institute of Physics, 335 East 45th Street, New York 17, N.Y. (USA), 1958.


58-2 Symposium on Non-Homogeneity in Elasticity and Plasticity, (Warsaw, Poland, 2-9 September 1958), organized by IUTAM. Published by Pergamon Press, Ltd., 4 & 5 Fitzroy Square, London W 1 (UK), 1959.


60-2 Colloquium on Creep in Structures, (Stanford, California, USA, 11-15 July 1960). Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1962.


63-1 Symposium on Stress Waves in Anelastic Solids, (Providence, Rhode Island, USA, 3-5 April 1963). Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1964.


64-2 Symposium on Concentrated Vortex Motions in Fluids, (Ann Arbor, Michigan, USA, 6-11 July 1964). A brief account by D. Küchemann of the problems discussed has


71-1 IUTAM Symposium on Unsteady Boundary Layers, (Quebec, Canada, May 24-28, 1971).
The Proceedings of the Symposium edited by E.A. Eichelbrenner have been published by Les Presses de l'Université Laval, C. P. 2447, Quebec 2, Canada, 1972.


71-3 IUTAM Symposium on Dynamics of Ionized Gases, (Tokyo, Japan, September 13-17, 1971).


72-3 IUTAM Symposium on Flow-induced Structural Vibrations, (University of Karlsruhe, FRG, August 14-18, 1972).
The Proceedings of the Symposium edited by E. Naudascher have been published by Springer-Verlag, Berlin, 1974.

73-1 Second IUTAM / IUGG Symposium on Turbulent Diffusion in Environmental Pollution, (Charlottesville, Virginia, USA, April 8-14, 1973).

The Proceedings of the Symposium edited by A. Sawczuk and Z. Mróz have been published by Springer-Verlag, Berlin, 1975.

The Proceedings edited by Y. Kozai have been published by D. Reidel Publishing Company, Dordrecht-Holland.

The Proceedings of the Symposium edited by J. Kestens have been published by Springer-Verlag, Berlin, 1975.

74-1 IUTAM Symposium on Buckling of Structures, (Harvard University, Cambridge, Massachusetts, USA, June 17-21, 1974).
The Proceedings of the Symposium edited by B. Budiansky have been published by Springer-Verlag, Berlin, 1976.

74-2 Joint COSPAR / IAU / IUTAM Symposium on Satellite Dynamics, (São Paulo, Brazil, June 19-21, 1974).

74-3 IUTAM Symposium on Dynamics of Rotors, (Lyngby, Denmark, August 12-16, 1974).

74-4 IUTAM Symposium on the Mechanics of the Contact between Deformable Bodies, (Enschede, The Netherlands, August 20-23, 1974).
The Proceedings of the Symposium edited by A.D. de Pater and J.J. Kalker have been published by Delft University Press, 1975.

74-5 IUTAM Symposium on the Mechanics of Visco-Elastic Media and Bodies, (Gothenburg, Sweden, September 2-6, 1974).
The Proceedings of the Symposium edited by J. Hult have been published by Springer-Verlag, Berlin, 1975.

The Proceedings of the Symposium edited by H. Pacejka have been published by Swets and Zeitlinger B.V., Amsterdam, 1976.


75-3 Joint IUTAM / IMU Symposium on Applications of Methods of Functional Analysis to Problems in Mechanics, (Marseilles, France, September 1-6, 1975).

75-4 Second IUTAM Symposium Transsonicum, (Göttingen, FRG, 8-13 September 1975).

76-1 IUTAM Symposium on Structure of Turbulence and Drag Reduction, (Washington, D.C., USA, 7-12 June 1976).

The Proceedings of the Symposium, edited by B.L. Clarkson, have

The Proceedings of the Symposium, edited by D.G. Provis and R. Radok, have been published by Springer-Verlag, Berlin, 1977 as Vol. 64 in the series Lecture Notes in Physics.

The Proceedings of the Symposium have been published by Société Française de Mécaniciens as a special issue of Revue Française de Mécanique, Paris, 1976.


77-2 *IUTAM Symposium on Dynamics of Multibody Systems*, (Munich, FRG, 29 August - 3 September 1977).


77-4 *IUTAM Symposium on Dynamics of Vehicles on Roads and Tracks*, (Vienna, Austria, 19-23 September 1977).

77-5 *IUTAM / IUGG Symposium on Monsoon Dynamics*, (Delhi, India, 5-9 December 1977).


The Proceedings of the Symposium, edited by N.H. Ibragimov and L.V. Ovsiannиков, have been published by the USSR Academy of Sciences, Siberian Branch, 1978.

78-3 *IUTAM Symposium on Non-Newtonian Fluid Mechanics*, (Louvain-la-Neuve, Belgium, 28 August - 1 September 1978).

78-4 *IUTAM Symposium on Metal Forming Plasticity*, (Tützing, FRG, 28 August - 3 September 1978).


79-1 *IUTAM Symposium on Structural Control*, (Waterloo, Ontario, Canada, 4-7 June 1979).

79-2 *IUTAM Symposium on the Physics and Mechanics of Ice*, (Copenhagen, Denmark, 6-10 August 1979).


79-4 *IAHR / IUTAM Symposium on Practical Experiences with Flow-Induced Vibrations*, (Karlsruhe, FRG, 3-6 September 1979).


The Proceedings of the Symposium, edited by J. Hult and J.
Lemaitre, have been published by Springer-Verlag, Berlin 1981.

80-2 IUTAM Symposium on Three-Dimensional Constitutive Relations and Ductile Fracture, (Dourdan, France, 2-5 June 1980).

80-3 IUTAM Symposium on Finite Elasticity, (Bethlehem, Pennsylvania, USA, 11-15 August 1980).


The Proceedings of the Symposium, edited by B.W. Ninham, J.T.G. Overbeek and A.C. Zettlemeyer, have been published in Advances in Colloid and Interface Science, Vol. 16 and 17 (1982).


The Proceedings of the Symposium, edited by L. Bengtsson and J. Lighthill, have been published by Springer-Verlag, Berlin 1982.


The Proceedings of the Symposium, edited by M. Pichal, have been published by the Institute of Thermomechanics, Czechoslovak Academy of Sciences, Prague, Czechoslovakia.

82-1 IUTAM Symposium on Three-Dimensional Turbulent Boundary Layers, (Berlin-West, 29 March - 1 April 1982).

82-2 IUTAM / COSPAR Symposium on Giant Planets and their Satellites, (Ottawa, Canada, 16 May - 2 June 1982).
The Proceedings of the Symposium, edited by M.G. Kivelson, have been published in "Advances in Space Research" 3:3 (1983), 1-111.

82-3 IUTAM / COSPAR Symposium on Impact Processes in Solid Bodies, (Ottawa, Canada, 15 May - 2 June 1982).

82-4 IUTAM / COSPAR Symposium on Fundamental Aspects of Material Science in Space, (Ottawa, Canada, 16 May - 2 June 1982).

82-5 IUTAM / ISIMM Symposium on Modern Developments in Analytical Mechanics, (Torino, Italy, 7-11 June 1982).
The Proceedings of the Symposium, edited by S. Benenti, M. Francaviglia and A. Lichnerowicz, have been published by the Academy of Sciences of Torino 1983.

82-6 IUTAM Symposium on Mechanics of Composite Materials, (Blacksburg, Virginia, USA, 16-19 August 1982).

82-7 IUTAM Symposium on Nonlinear Deformation Waves, (Tallinn, Estonian SSR, USSR, 22-28 August 1982).

82-8 IUTAM Symposium on Collapse, (London, UK, 31 August - 3 September 1982).
The Proceedings of the Symposium, edited by J.M.T. Thompson & G.W. Hunt, have been published by Cambridge University Press 1983.

82-9 IUTAM Symposium on Deformation and Failure of Granular Materials, (Delft, The Netherlands, 31 August - 3 September 1982).

82-10 IUTAM Symposium on Structure of Complex Turbulent Shear Flow, (Marseilles, France, 31 August - 3 September 1982).

82-11 IUTAM Symposium on Metallurgical Applications of

82-12 IUTAM Symposium on Random Vibrations and Reliability, (Frankfurt/Oder, GDR, 31 October - 6 November 1982).
The Proceedings of the Symposium, edited by K. Hennig, have been published by Akademie-Verlag, Berlin 1983.

83-1 IUTAM / IUPAP Symposium on the Mechanical Behavior of Electromagnetic Solid Continua, (Paris, France, 4-7 July 1983).


83-5 IUTAM / IUGG Symposium on Seabed Mechanics, (Newcastle upon Tyne, UK, 5-9 September 1983).
The Proceedings of the Symposium, edited by B. Denness, have been published by Graham & Trotman, London 1983.

83-6 IUTAM Symposium on Turbulence and Chaotic Behavior in Fluids, (Kyoto, Japan, 5-10 September 1983).
The Proceedings of the Symposium, edited by T. Takami, have been published by North-Holland, Amsterdam, 1984.


84-2 IUTAM Symposium on Probabilistic Methods in Mechanics of Solids and Structures, (Stockholm, Sweden, 19-21 June 1984, to the

Memory of W. Weibull).

84-3 IUTAM Symposium on the Influence of Polymer Additives on Velocity and Temperature Fields, (Essen, FRG, 26-28 June 1984).
The Proceedings of the Symposium, edited by B. Gampert, have been published by Springer-Verlag, Berlin, 1986.

The Proceedings of the Symposium, edited by V.V. Kozlov, have been published by Springer-Verlag, Berlin 1985.

The Proceedings of the Symposium, edited by M. Pichal, have been published by Springer-Verlag, Berlin 1985.

85-1 IUTAM Symposium on Mechanics of Damage and Fatigue, (Haifa and Tel Aviv, Israel, 1-4 July 1985).


85-4 IUTAM Symposium on Inelastic Behavior of Plates and Shells, (Rio de Janeiro, Brazil, 5-9 August 1985).


85-6 IUTAM Symposium on Mixing in Stratified Fluids, (Margaret River, Australia, 25-28 August 1985).

85-7 IUTAM Symposium on Turbulent Shear-Layer/Shock-Wave Interactions, (Palaiseau, France, 9-12 September 1985).
The Proceedings of the Symposium, edited by J. Delery, have been


87-1 IUTAM Symposium on Turbulence Management and Relaminarisation, (Bangalore, India, 19-23 January 1987).

87-2 IUTAM Symposium on Advanced Boundary Element Methods: Applications in Solid and Fluid Mechanics, (San Antonio, Texas, USA, 13-16 April 1987).


87-7 IUTAM Symposium on Fundamental Aspects of Vortex Motion, (Tokyo, Japan, 31 August - 4 September 1987).

88-1 IUTAM Symposium on Structural Optimization, (Melbourne, Australia, 9-13 February 1988).

88-2 IUTAM Symposium on Recent Advances in Nonlinear Fracture Mechanics, (Pasadena, California, USA, 14-16 March 1988).


88-4 IUTAM Symposium on Liquid Metal Magnetohydrodynamics, (Riga, USSR, 16-20 May 1988).


90-9 IUTAM Symposium on Creep in Structures, (Cracow, Poland, 10-14 September 1990). The Proceedings of the Symposium, edited by M. Zyczkowski, have

91-1 IUTAM Symposium on Aerothermodynamics in Combustors, (Taipei, Taiwan, 3-5 June 1991).
Whitelaw and T.S. Wung, have been published by Springer-Verlag,

91-2 IUTAM Symposium on Mechanical Effects of Welding, (Lulea,
Sweden, 10-14 June 1991).
The Proceedings of the Symposium, edited by L. Karlsson, L.E.
Lindgren and M. Jonsson, have been published by Springer-Verlag,

91-3 IUTAM Symposium on Nonlinear Stochastic Mechanics, (Torino,
Italy, 1-5 July 1991).
The Proceedings of the Symposium, edited by N. Bellomo and F.
Casciati, have been published by Springer-Verlag, Berlin, 1992.
ISBN 3-540-55545-5

91-4 IUTAM Symposium on Mechanics of Fluidized Beds, (Stanford,
No Proceedings of the Symposium have been published. The "Report
of a Symposium on Mechanics of Fluidized Beds" by G.M. Homsy,
R. Jackson and J.R. Grace has been published in the Journal of Fluid
Mechanics (1992), vol. 236, 477-495

91-5 IUTAM Symposium on Breaking Waves, (Sydney, Australia, 15-19
The Proceedings of the Symposium, edited by M.L. Banner and R.
Grimshaw, have been published by Springer-Verlag, Berlin, 1992.
ISBN 3-540-55944-2

91-6 IUTAM Symposium on Constitutive Relations for Finite
Deformations of Polycrystalline Metals, (Beijing, China, 22-25 July
The Proceedings of the Symposium, edited by Ren Wang and D.C.
Drucker, have been published by Springer-Verlag, Berlin, 1992.
ISBN 3-540-55128-X

91-7 IUTAM Symposium on Finite Inelastic Deformations – Theory and
Application, (Hannover, Germany, 19-23 August 1991).
The Proceedings of the Symposium, edited by D. Besedo and E.
Stein, have been published by Springer-Verlag, Berlin, 1992. ISBN 3-540-
55849-7

91-8 IUTAM Symposium on Interpretation of Time Series from
The Proceedings of the Symposium, edited by P.G. Drazin and G.P.
King, have been published by North Holland, Elsevier Science Publ,
Amsterdam, PHYSICA D NONLINEAR PHENOMENA, Vol. 58,
1992. ISSN 0167-2789

91-9 IUTAM Symposium on Microgravity Fluid Mechanics, (Bremen,
Germany, 2-6 September 1991).

The Proceedings of the Symposium, edited by H.J. Rath, have been

91-10 IUTAM Symposium on Local Mechanics Concepts for Composite
Reifsnider, have been published by Springer-Verlag, Berlin, 1992.
ISBN 3-540-55547-1

92-1 IUTAM Symposium on Optimal Control of Mechanical Systems
(Moscow, Russia, 19-25 April 1992).
The Proceedings of the Symposium, co-edited by F.L. Chernouso,
have been published in Russian in the form of a (special) issue of the
journal "Izvestiya of the Russian Academy of Sciences, Tekhnicheskaya
Kibernetika, No. 1, Jan–Feb. 1993", ISSN 0002–3388; and in the English translation of this journal published by
Scripta Technica Inc., A. Wiley Company, New York

92-2 IUTAM Symposium on Inverse Problems in Engineering Mechanics
The Proceedings of the Symposium, edited by M. Tanaka and H.D.
Bui, have been published by Springer-Verlag, Berlin, 1993. ISBN 3-
540-56345-8

92-3 IUTAM Symposium on Optimal Design with Advanced Materials.
The Frithiof I. Nordson Volume, (Lyngby, Denmark, 18-20 August
The Proceedings of the Symposium, edited by P. Pedersen, have
ISBN 0444 89869 7

92-4 IUTAM Symposium on Aerothermochemistry of Spacecraft and
Associated Hypersonic Flows (Marseille, France, 1-4 September
The Proceedings of the Symposium, edited by R. Brun and A.A.
Chikhaoui, have been published by Jouve, 18, rue Saint–Denis, F-

92-5 IUTAM Symposium on Bluff-Body Wakes, Dynamics and
Instabilities (Göttingen, Germany, 7-11 September 1992).
The Proceedings of the Symposium, edited by H. Eckelmann, J.M.R.
Graham, P. Huerre and P.A. Monkewitz, have been published by

92-6 IUTAM Symposium on Fluid Dynamics of High Angle of Attack
(Tokyo, Japan, 13-17 September 1992).
The Proceedings of the Symposium, edited by R. Kawamura and Y.
Aihara, have been published by Springer-Verlag, Berlin, 1993. ISBN 3-
540-56593-0

92-7 IUTAM Symposium on Eddy Structure Identification in Free
Turbulent Shear Flow (Poitiers, France, 12-14 October 1992).
The Proceedings of the Symposium, edited by J.P. Bonnet and M.N.
Glauser, have been published by Kluwer Academic Publishers,
93-1 **IUTAM Symposium on Probabilistic Structural Mechanics: Advances in Structural Reliability Methods** (San Antonio, Texas, USA, 7-10 June 1993)


The Proceedings of the Symposium have been published as a special issue in a journal "Modelling and Simulation in Materials Science and Engineering", edited by M. Ortiz and C.F. Shih, Vol 2 No 3A 421-782 May 1994, ISSN: 0965-0393


93-4 **IUTAM Symposium on Nonlinear Instability of Nonparallel Flows** (Potsdam, NY, USA, 26-31 July 1993).


The Proceedings of the Symposium, edited by P.C. Muller, have been published by Springer-Verlag, Berlin, 1995. Publication is still pending (May 1995)

93-7 **IUTAM Symposium on Discrete Structural Optimization** (Zakopane, Poland, 31 August–3 September 1993).


93-8 **IUTAM Symposium on Bubble Dynamics and Interface Phenomena** (Birmingham, UK, 6-9 September 1993).


93-9 **IUTAM Symposium on Fracture of Brittle, Disordered Materials: Concrete, Rock and Ceramics** (Brisbane, Australia, 20-24 September 1993).


93-10 **IUTAM Symposium on Impact Dynamics** (Beijing, China, 11-15 October 1993).

The Proceedings of the Symposium, edited by Zheng Zhemin (Chemin Cheng) and Tan Qingming, have been published by Peking University Press, Beijing, China, 1994. ISBN 7-301-02489-4 0 338


94-2 **IUTAM Symposium on Waves in Liquid/Gas and Liquid/Vapor Two-Phase Systems** (Kyoto, Japan, 9-13 May 1994).


94-8 **IUTAM Symposium on The Active Control of Vibrations** (Bath, UK, 5-8 September 1994).


d) Proceedings of the International Congresses for 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 separately entrusted to a local Organizing Committee undertaking also the publication of the Proceedings. Consequently, there is no central point from which Proceedings can 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.


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.


11th International Congress on Theoretical and Applied Mechanics (ICTAM), Munich (Germany), 30 August - 5 September 1964. The Proceedings edited by H. Göttler have been published by Springer-Verlag, Heidelberger Platz 3, Berlin (Germany), 1966.

12th International Congress on Theoretical and Applied Mechanics (ICTAM), Stanford, Cal. (USA), 26-31 August 1968. The Proceedings, edited by M. Hetényi and W.G. Vincenti, have been published by Springer-Verlag, Berlin (Germany), 1969.


have been published by Elsevier Science Publishers, Amsterdam 1993. ISBN 0 444 88889 6

e) History of IUTAM

(Please note again: The publications listed above, with the exception of the Annual Reports, are not available at the IUTAM Secretariat. Please, order directly from the publisher).

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