INTERNATIONAL UNION OF THEORETICAL AND
APPLIED MECHANICS

REPORT 1984

IUTAM
University of Stuttgart
Federal Republic of Germany
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Edited by Werner Schiehlen, Secretary-General of IUTAM
Printed in the Federal Republic of Germany
by Schwäbische Druckerei, Stuttgart
The following members of the Bureau of IUTAM have been elected for the period 1 November 1984 to 31 October 1988:

**Officers:**
- President: Sir J. Lighthill (UK)
- Vice-President: Prof. D.C. Drucker (USA)
- Treasurer: Prof. L. van Wijngaarden (Netherlands)
- Secretary: Prof. W. Schiehlen (FRG)

**Members:**
- Prof. P. Germain (France) (elected 1976)
- Prof. J. Hult (Sweden) (1984)
- Prof. I. Imai (Japan) (1984)

**Secretariat**

IUTAM Secretariat
Institute B of Mechanics
University of Stuttgart
Pfaffenwaldring 9
D-7000 Stuttgart 80
Federal Republic of Germany
Telephone: (0711) 685-63 89
Telex: 7255 445 univ d

**Past Officers**

<table>
<thead>
<tr>
<th>Year</th>
<th>Elected President</th>
<th>Vice-President</th>
<th>Treasurer</th>
<th>Secretary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td>J. Pères (France)</td>
<td>R.V. Southwell (UK)</td>
<td>H.L. Dryden (USA)</td>
<td>J.M. Burgers (Netherlands)</td>
</tr>
<tr>
<td>1952</td>
<td>H.L. Dryden (USA)</td>
<td>J. Pères (France)</td>
<td>G. Temple (UK)</td>
<td>F.A.v.d. Dun- gen (Belgium)</td>
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<td>1956</td>
<td>F.K.G. Odqvist (Sweden)</td>
<td>H.L. Dryden (USA)</td>
<td>G. Temple (UK)</td>
<td>M. Roy (France)</td>
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<td>1960</td>
<td>G. Temple (UK)</td>
<td>F.K.G. Odqvist W.T. Koiter (Sweden)</td>
<td>W.T. Koiter (Netherlands)</td>
<td>M. Roy (France)</td>
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<td>1964</td>
<td>M. Roy (France)</td>
<td>G. Temple (UK)</td>
<td>W.T. Koiter (Netherlands)</td>
<td>H. Görtler (Germany)</td>
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<td>1968</td>
<td>W.T. Koiter (Netherlands)</td>
<td>M. Roy (France)</td>
<td>H. Görtler (Germany)</td>
<td>F.I. Nio- rdsen (Denmark)</td>
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<td>1972</td>
<td>H. Görtler (Germany)</td>
<td>W.T. Koiter (Netherlands)</td>
<td>D.C. Drucker (USA)</td>
<td>F.I. Nio- rdsen (Denmark)</td>
</tr>
<tr>
<td>1976</td>
<td>F.I. Nio- rdsen (Denmark)</td>
<td>H. Görtler (Germany)</td>
<td>D.C. Drucker (USA)</td>
<td>J. Hult (Sweden)</td>
</tr>
<tr>
<td>1980</td>
<td>D.C. Drucker (USA)</td>
<td>F.I. Nio- rdsen (Denmark)</td>
<td>E. Becker (FRG)</td>
<td>J. Hult (Sweden)</td>
</tr>
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</table>

**Adhering Organizations**

**Argentina** (1959)
Sociedad Argentina de Mecanica Teorica y Aplicada Facultad de Ingenieria, Paseo Colon 850, Buenos Aires
Chairman: Prof. Arturo Guzman
Representative: Dr. Mario Gradowczyk

**Australia** (1964)
The Australian National Committee for Theoretical and Applied Mechanics of the Australian Academy of Science, GPO Box 783, Canberra City, ACT 2601
Chairman: Prof. J. Imberger
Representative: Dr. J.R. Philip, FRS, FAA

**Austria** (1951)
The Austrian National Committee for Theoretical and Applied Mechanics, Öster- reichische Akademie der Wissenschaften, Dr. Ignaz-Seipel-Platz 2, A-1040 Wien
Chairman: Prof. F. Ziegler
Representative: Prof. F. Ziegler

**Belgium** (1949)
The National Committee for Theoretical and Applied Mechanics of the Class of Sciences of the Royal Belgian Academy, Brussels
President: Prof. R. Mertens
Representatives: Prof. P. Janssens, Prof. J. Kestens, Prof. R. Mertens

**Brazil** (1982)
Associação Brasileira de Ciências Mecânicas, Centro Tecnológico, UFSC, C.P. 476, 88000 Florianópolis,
President: Prof. L. Bevilacqua
Representative: Prof. L. Bevilacqua

**Bulgaria** (1969)
The Bulgarian National Committee for Theoretical and Applied Mechanics at the Bulgarian Academy of Sciences, "Acad. G. Bonchev" str. bl. 8, 1113 Sofia
President: Acad. G. Brankov
Vice-President: Prof. D. Kolarov
Secretary: Assist. Prof. S. Radev
Representatives: Acad. G. Brankov, Prof. D. Kolarov
Canada (1963)
The National Research Council of Canada, Ottawa, Canada, K1A OR6
President: Dr. L. Kerwin
Chairman of Canadian National Committee for IUTAM: Prof. B. Tabarrok
Representatives: Prof. F. P. J. Rimrott, Prof. B. Tabarrok, Prof. K. W. Neale, Dr. S. R. Swanson

China (1980)
The Chinese Society of Theoretical and Applied Mechanics, Beijing, China
Chairman: Prof. L. H. Tsien
Representative: Prof. T. C. Lin
The Society of Theoretical and Applied Mechanics, Taipei, China
President: Prof. T. Y. Wung
Representative: Prof. F. T. Sun

Czechoslovakia (1949)
The Czechoslovak Committee of Theoretical and Applied Mechanics of the Czechoslovak Academy of Sciences, Podbáská 13, 16612 Prague 6
President: Prof. V. Krupka
Secretary: Dr. A. G. Curev
Representatives: Prof. J. Nemec, Prof. V. Krupka

Denmark (1949)
The Royal Danish Academy of Sciences and Letters (Det Kongelige Danske Videnskabernes Selskab), H. C. Andersens Boulevard 35, DK-1553 Copenhagen V.
President: Prof. Jens Lindhard
Secretary: Prof. Dr. C. Crone
Representatives: Prof. F. I. Niordson, Prof. E. Hansen

Egypt (1976)
Academy of Scientific Research & Technology, 101, Kasr El-Eini St., Cairo
Chairman: Prof. R. H. Dawoud
Secretary: Dr. M. A. A. Nassar
Representative: Prof. R. H. Dawoud

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

France (1949)
Comité National Français de Mécanique, Académie des Sciences, 23, quai Conti, 75006 Paris, France
President: Prof. Paul Germain
Secretary: G. Duvaut
Representatives: Prof. P. Germain, Prof. G. Iooss, Prof. G. Lespinard, Prof. M. Roseau

The National Committee of BRD within the Gesellschaft für Angewandte Mathematik und Mechanik, Mathematisches Institut A der Universität, Pfaffenwaldring 57, D-7000 Stuttgart 80
Chairman: Prof. K. Kirchgässner
Representatives: Prof. H. Hornung, Prof. H. Lippmann, Prof. W. Schiehlen, vacant

German Dem. Rep., (GDR) (1973)
Academy of Sciences of the GDR, Otto-Nuschke-Strasse 22/23 DDR-1080 Berlin
President: Prof. Dr. sc. med. W. Scheler
Secretary General: Prof. Dr. habil. C. Grote
Representatives: Prof. W. Albring, Prof. K. Hennig, Prof. G. Schmidt

Greece (1979)
Hellenic Society for Theoretical and Applied Mechanics, Athens National Technical University, 5 Heroes of Polytechnion Avenue, Athens (624)
President: A. E. Armenakas
Secretary: Prof. A. Kounadis
Representative: Prof. P. S. Theocaris

Hungary (1948)
Hungarian National Committee for IUTAM, Department of Mechanics, Technical University Budapest, Műegyetem rkp. 3, 1521 Budapest
President: Prof. János Szabó
Secretary: Prof. S. Kaliszky
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-110 002
Chairman: Prof. N. Narasimha
Representatives: Prof. R. Narasimha, Prof. N. C. Nigam, vacant


Ireland (1984)
Irish National Committee for Theoretical and Applied Mechanics, Royal Irish Academy, 19 Dawson Street, Dublin 2
Chairman: Prof. M.A. Hayes
Secretary: A. Duggan
Representative: Prof. M.A. Hayes

Israel (1950)
The Israel Society for Theoretical and Applied Mechanics, School of Engineering, Tel Aviv University, Tel Aviv, Israel
President: Prof. Z. Hashin
Representatives: Prof. Z. Hashin, Prof. Sol R. Bodner

Italy (1949)
Associazione Italiana di Meccanica Teorica ed Applicata, Piazza Leonardo da Vinci 32, 20133 Milano
President: Prof. Giovanni Bianchi
Secretary: Prof. Carlo Cercignani
Representatives: Prof. G. Bianchi, Prof. D. Galletto, Prof. C. Cercignani, Prof. P. Villaggio

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. Isao Imai
Representatives: Prof. I. Imai, Prof. I. Tani, Prof. Y. Yamamoto, Prof. K. Kawata

Netherlands (1952)
Department for Mechanics of the Royal Institute of Engineers, Secr. Technische Hogeschool Eindhoven, WH 0. 131, Postbus 513, 5600 MB Eindhoven
President: Prof. J. Blauwendaal
Secretary: Dr. C. M. Menken
Representatives: Prof. J. F. Besseling, Prof. J. Blauwendaal, Prof. G. Vossers

New Zealand (1979)
The Royal Society of New Zealand, Private Bag, Wellington
President: Dr. E.G. Bolland
Executive Officer: Mr. A.W.F. Thynne
Representative: Prof. I.F. Collins

Norway (1949)
The National Committee on Theoretical and Applied Mechanics of the Norwegian Academy of Sciences and Letters, Dept. of Mathematics, University of Bergen, 5014 Bergen
President: Prof. Sigve Tjotta
Representative: Prof. Sigve Tjotta

Poland (1952)
Committee for Mechanics of the Polish Academy of Sciences, Swietokrzyska 21, 00-049 Warsaw
President: Prof. W. Szczepinski
Representatives: Prof. W. Szczepinski, vacant

Portugal (1968)
The Portuguese National Committee for Theoretical and Applied Mechanics, Instituto Superior Técnico, Avenida Rovisco Pais, 1096 Lisboa Codex
Chairman: Prof. E. R. de Arantes e Oliveira
Vice-Presidents: Prof. A. Ribeiro Gomes, Prof. J. Novais Barbosa
Secretary: Prof. A. Tovar de Lemos
Representative: Prof. E. R. de Arantes e Oliveira

Roumania (1956)
Section des Sciences Techniques de l’Academie de la RS de Roumanie, 15, rue Constantin Mille, Bucarest
Representative: vacant

Spain (1950)
Representative: Dr. M. Bautista Aranda

Sweden (1950)
Swedish National Committee for Mechanics, The Royal Institute of Technology, S-100 44 Stockholm
President: Prof. J. Carlsson
Secretary: Dr. B. Sundström
Representatives: Prof. S. Berndt, Prof. J. Hult, Prof. J. Carlsson

Switzerland (1950)
Board of the Federal Institutes of Technology (Eidgenössische Technische Hochschulen Zürich und Lausanne) ETH-Zentrum, CH-8092 Zürich
Chairman: Prof. Maurice Cosandey
Secretary: Dr. Johannes Fulda
Representatives: Prof. I. L. Ryhming, Prof. M. Sayir

Turkey (1977)
Turkish National Committee of Theoretical and Applied Mechanics, Istanbul Teknik Üniversitesi, Fen-Edebiyat Fakültesi, İ.Ü. Kampüsü, Maslak, İstanbul
President: Prof. Murat Dikmen
Secretary-General: Prof. Esin Ergintan Inan
Representative: Prof. Murat Dikmen
UK (1948)
The Royal Society, 6 Carlton House Terrace, London SW 1 Y 5AG
Chairman of British National Committee for Theoretical and Applied Mechanics: Sir James Lighthill
Executive Secretary of the Royal Society: Dr. R.W.J. Keay
Representatives: Prof. T.B. Benjamin, Prof. H. Charnock, Sir Peter Hirsch, Prof. J.T. Stuart, Prof. W.H. Wittrick

USA (1949)
The U.S. National Committee on Theoretical and Applied Mechanics, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C., 20418
Chairman: Prof. James W. Dally
Vice-Chairman: Prof. J.B. Keller
Secretary: Prof. Philip G. Hodge, Jr.
Representatives: Prof. J.W. Dally, Prof. D.C. Drucker, Prof. P.G. Hodge Jr., Prof. J.B. Keller, Prof. P.M. Naghdi

USSR (1956)
USSR National Committee on Theoretical and Applied Mechanics, Prospekt Vernadskogo 101, Moscow 117526
President: Prof. I.F. Obraztsov
Secretary: Prof. G.K. Mikhailov
Representatives: Prof. O.M. Belotserkovsky, Prof. G.G. Chernyi, Prof. A.Yu. Ishlinsky, Prof. G.K. Mikhailov, Prof. I.F. Obraztsov

Yugoslavia (1952)
Yugoslav Society of Mechanics, Postanski fah 218, Kneza Milosa 9/1, Beograd
President: Prof. L. Vujosević
Secretary: Prof. J. Jarić
Representative: Prof. J. Jarić, vacant

Affiliated organizations

CISM (1970)
International Centre for Mechanical Sciences, Palazzo del Torso, Piazza Garibaldi, Udine, Italy
President: Avv. Vinicio Turello
Secretary-General: Prof. G. Bianchi
Rectors: Prof. P. Brousse, Prof. H. Lippmann
Representative: Prof. G. Bianchi
Representative of IUTAM in CISM: Prof. H. Lippmann

ICHMT (1972)
International Centre for Heat and Mass Transfer, Beograd, P.O. Box 522, Yugoslavia
President: Prof. U. Grigull
Secretary-General: Prof. Z. Zarić
Representative: Prof. Z. Zarić
Representative of IUTAM in ICHMT: Prof. L.I. Sedov

ICR (1974)
International Committee on Rheology, Prof. N.W. Tschoegl, Division of Chemistry and Chemical Engineering 205-41, California Institute of Technology, Pasadena, California 91125, USA
Chairman: Prof. B. Mena
Secretary: Prof. N. Tschoegl
Representative: Dr. J.R.A. Pearson
Representative of IUTAM in ICR: Prof. F.I. Niordson

Euromech (1978)
European Mechanics Committee, Prof. Dr.-Ing. H.H. Fernholz, Hermann-Föttinger-Institut für Thermo- und Fluiddynamik, Technische Universität, Strasse des 17. Juni 135, D-1000 Berlin 12
Chairman: Prof. G.K. Batchelor
Secretary: Prof. H.H. Fernholz
Representative: Prof. L. van Wijngaarden
Representative of IUTAM in Euromech: Prof. L. van Wijngaarden

IAVSD (1978)
International Association for Vehicle System Dynamics, Prof. H.B. Pacejka, Delft University of Technology, Vehicle Research Laboratory, P.O. Box 5038, 2600 GA Delft, The Netherlands
President: Dr. A.H. Wickens
Secretary: Prof. H.B. Pacejka
Representative: Prof. H.B. Pacejka
Representative of IUTAM in IAVSD: Prof. W. Schiehlen

ISIMM (1978)
International Society for the Interaction of Mechanics and Mathematics, Prof. W. Nowacki, Polish Academy of Sciences, Institute of Fundamental Technological Research, ul. Swietokrzyska 21, 00-049 Warsaw, Poland
President: Prof. W. Nowacki
Secretary: Prof. H. Zorski
Representative: Prof. W.T. Koiter
Representative of IUTAM in ISIMM: Prof. P. Germain
ICF (1978)
International Congress on Fracture, Prof. T. Yokobori, Research Institute for Strength and Fracture of Materials, Tohoku University, Aramaki Aoba, Sendai, Japan
Founder President: Prof. T. Yokobori
President: Prof. D.M.R. Taplin
Secretary: Prof. T. Yokobori
Representative of IUTAM in ICF: Prof. J. Hult

ICM (1982)
President: Prof. J. Carlsson
Secretary: Dr. N.G. Ohlson
Representative of IUTAM in ICM: Prof. D.C. Drucker

AFMC (1982)
Asian Fluid Mechanics Committee, Professor T.C. Lin, Institute of Mechanics, Chinese Academy of Sciences, Beijing 100080, China
President: Prof. H. Sato
Representative of IUTAM in AFMC: Prof. I. Imai

IACM (1984)
International Association for Computational Mechanics, Prof. R.H. Gallagher, Worcester Polytechnic Institute, Worcester, MA 01609, USA
Secretary: Prof. R.H. Gallagher
Representative of IUTAM in IACM: Prof. E.R. de Arantes e Oliveira

Members of the General Assembly

Prof. W. Albring (GDR)
Prof. E.R. de Arantes e Oliveira (Portugal)
Prof. G. Batchelor (UK)
Dr. M. Bautista Aranda (Spain)
Prof. O.M. Belotserkovsky (USSR)
Prof. T.B. Benjamin (UK)
Prof. S. Berndt (Sweden)
Prof. J.F. Besseling (Netherlands)
Prof. L. Bevilaqua (Brazil)
Prof. G. Bianchi (Italy)
Prof. J. Blauuwendaal (Netherlands)
Prof. S.R. Bodner (Israel)
Prof. B.A. Boley (USA)
Prof. G. Brankov (Bulgaria)
Prof. J. Carlsson (Sweden)
Prof. C. Cercignani (Italy)
Prof. H. Charnock (UK)
Prof. G.G. Chernyi (USSR)
Prof. I.P. Collins (New Zealand)
Prof. J.W. Dally (USA)
Prof. R.H. Dawoud (Egypt)
Prof. M. Dikmen (Turkey)
Prof. D.C. Drucker (USA)
Prof. W. Fiszdon (Poland)
Dr. F.N. Frenkel (USA)
Prof. D. Galletto (Italy)
Prof. P. Germain (France)
Prof. S. Goldstein (USA)
Dr. M. Gradowczyk (Argentina)
Prof. E. Hansen (Denmark)
Prof. Z. Hashin (Israel)
Prof. M.A. Hayes (Ireland)
Prof. K. Henning (GDR)
Sir Peter Hirsch (UK)
Prof. P.G. Hodge, Jr. (USA)
Prof. N.J. Hoff (USA)
Prof. H. Hornung (FRG)
Prof. J. Hult (Sweden)
Prof. I. Imai (Japan)
Prof. G. Iosses (France)
Prof. A. Yu. Ishlinsky (USSR)
Prof. P. Janssens (Belgium)
Prof. J. Jarić (Yugoslavia)
Prof. S. Kaliszky (Hungary)
Prof. T. Kawata (Japan)
Prof. J.B. Keller (USA)
Prof. J. Kestens (Belgium)
Prof. W.T. Koiter (Netherlands)
Prof. D. Kolarov (Bulgaria)
Prof. V. Krupka (CSSR)
Prof. Y.H. Ku (USA)
Prof. G. Lespinard (France)
Sir James Lighthill (UK)
Prof. T.C. Lin (China)
Prof. H. Lippmann (FRG)
Prof. R. Mertens (Belgium)
Prof. G.K. Mikhailov (USSR)
Prof. K. Miller (UK)
Prof. P.M. Naghdi (USA)
Prof. R. Narasimha (India)
Prof. K.W. Neale (Canada)
Prof. J. Nemec (CSSR)
Prof. N.C. Nigam (India)
Prof. F.I. Niordson (Denmark)
Prof. I.M. Obraztsov (USSR)
Prof. H.B. Pacejka (Netherlands)
Prof. J.R. Philip (Australia)
Prof. J.R.A. Pearson (UK)
Prof. M.A. Ranta (Finland)
Prof. F.P.J. Rimrott (Canada)
Prof. M. Roseau (France)
Prof. M. Roy (France)
Prof. L.L. Ryhming (Switzerland)
Prof. M. Sayir (Switzerland)
Prof. W. Schiehlen (FRG)
Prof. G. Schmidt (GDR)
Prof. L.I. Sedov (USSR)
Prof. J.T. Stuart (UK)
Prof. F.T. Sun (China)
Dr. S.R. Swanson (Canada)
Prof. W. Szczepinski (Poland)

† Representing Affiliated Organization. ‡ Representing also Affiliated Organization.
**Members of the Congress Committee**

Prof. A. Acrivos (USA) 1986  
Prof. E. R. de Arantes e Oliveira (Portugal) 1986  
Prof. L. Bevilacqua (Brazil) 1988  
* Prof. B. A. Boley (USA) 1992  
Prof. J. Brilla (CSSR) 1988  
Prof. G. G. Chernyi (USSR) 1988  
Prof. I. F. Collins (New Zealand) 1988  
Prof. S. Dhawan (India) 1986  
Prof. D. C. Drucker (USA) 1988  
* Prof. W. Fiszdon (Poland) 1988  
Prof. N. J. Hoff (USA) 1988  
Prof. J. Hult (Sweden) 1988  
Prof. I. Imai (Japan) 1988  
Prof. A. Yu. Ishlinsky (USSR) 1988  
Prof. S. Kaliszyk (Hungary) 1986  
Prof. Y. H. Ku (USA) 1986  
* Sir James Lighthill, Chairman (UK) 1988  
Prof. T. C. Lin (China) 1986  
Prof. G. Maier (Italy) 1986  
* Prof. H. K. Moffatt, Secretary (UK) 1988  
Prof. R. Moreau (France) 1986  
Prof. E. A. Müller (FRG) 1988  
* Prof. F. I. Niordson (Denmark) 1988  
Prof. Lingxi Qian (China) 1988  
Prof. F. P. J. Rimrott (Canada) 1988  
Prof. M. Roy (France) 1988  
Prof. W. Schiehlen (FRG) 1986  
Prof. W. Schneider (Austria) 1986  
Prof. J. Singer (Israel) 1988  
* Prof. L. van Wyngaarden (Netherlands) 1988  
Prof. J. R. Willis (UK) 1986  
Prof. P. Y. Zhou (China) 1986  

Year, where stated, indicates end of term (applies to members elected after 1972)  

**Reports of Symposia held in 1984**

1.


**Scientific Committee**  
B. A. Bilby, UK  
H. D. Bui, France  
A. J. Carlsson, Sweden  
D. C. Drucker, USA  
M. Elices, Spain  
K. J. Miller, UK (Chairman)  
H. Okamura, Japan  
D. M. Radenkovic, France  
J. R. Rice, USA

**Short summary of scientific progress achieved**

The objective of the symposium was originally conceived and approved by IUTAM to discuss the behaviour of very small fatigue cracks in order to show how microstructural features such as grains, grain boundaries, inclusions, texture and alloy composition affected the mechanics of growth of very small defects. However, the format of the conference was broadened two years before its start, with the agreement of IUTAM, after several requests were received for a conference to honour the memory and work of Professor J. D. Eshelby, F.R.S. who had recently died. In consequence the conference was divided into six sections, each relating to problems Professor Eshelby had investigated, including the behaviour of short cracks.

The symposium brought together chemists, engineers, material scientists, mathematicians and physicists who described recent advances both theoretically and experimentally, relating to metals, ceramics, polymeric and composite materials. Because of the various experiences and disciplines of delegates and the wide range of material systems discussed, this interdisciplinary gather-
ing permitted a far greater appreciation of problems and possible solutions than would otherwise have been achieved. Discussions ranged from the level of dislocation theories through the effects of material production techniques to the behaviour of large scale engineering components.

A booklet of abstracts was made available to participants and the full proceedings of the symposium, including information on poster displays and papers not presented orally, has already been published; see details below.

Countries represented and number of participants

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Publication of Proceedings

The proceedings have been published by Cambridge University Press and are entitled “Fundamentals of Deformation and Fracture” (Editors: B.A. Bilby, K.J. Miller and J.R. Willis) ISBN 0521267358.

Financial Support

Financial support of the Symposium has been generously provided by the International Union of Theoretical and Applied Mechanics.

Session Titles and Organizers

Introductory lecture
B. A. Bilby, F.R.S.

Conservation laws and their applications
J.R. Rice

Inclusions, inhomogeneities and composites
A. Kelly, F.R.S.
T. Mura
B. Budiansky
K.J. Miller
L.M. Brown, F.R.S.

Dynamics of dislocations and cracks
J.R. Willis
C. Atkinson

Dislocation and point defects
R. Bullough
Sir Peter Hirsch, F.R.S.

Creep fracture
M.F. Ashby, F.R.S.
G.W. Greenwood

SCIENTIFIC PROGRAMME

Monday, April 2
K.J. Miller: Opening remarks
B.A. Bilby: Introductory lecture
J.R. Rice: Conserved integrals and energetic forces
P.J. Olver: Symmetry groups and path-independent integrals

A.G. Herrmann: Conservation laws, the material momentum tensor and moments of elastic energy
T. Mura: General theory of inclusions
L.J. Walpole: The analysis of the overall elastic properties of composite materials
L.R. F. Rose: Theoretical aspects of reinforcement and toughening
N. Laws & G.J. Dvorak: The loss of stiffness of cracked laminates
O.B. Pedersen: Mean field theory and the Bauschinger effect in composites
J.K. Lee & W.C. Johnson: Elastic interaction and elastoplastic deformation of inhomogeneities

Tuesday, April 3
L.B. Freund: The mechanics of dynamic crack growth in solids
A. Granato: Dislocation damping and phonon scattering
C. Atkinson: Invariant integrals for some time dependent crack and heat conduction problems
J.D. Achenbach & Z.-L. Li: Plastic deformations near a rapidly propagating crack tip
K.B. Broberg: What happens at fast crack growth?

A.S. Argon, C.W. Lau, B. Ozmat & D.M. Parks: Creep crack growth in ductile alloys
H. Liibolt: Strength contributions during creep of composite materials
T. Mori: Suppression of grain boundary sliding by second phase particles
H. Riedel: A continuum damage approach to creep crack growth
Z. Hashin: Thermal expansion of polycrystalline aggregates
G.W. Greenwood: The roles of dislocation motion and vacancy fluxes in creep

Wednesday, April 4
P.B. Hirsch: Dislocations in semiconductors
P.L. Pratt: Dislocations in ionic crystals
L.M. Brown: Image stress and the Bauschinger effect in dispersion-hardened alloys
B.L. Eyre: Geometry and behaviour of prismatic dislocation loops and stacking fault tetrahedra
P.M. Hazzledine: Direct observations of anisotropic and surface effects on dislocations
D.J. Bacon: Dislocations in anisotropic elastic media
G.K. Wong & D.M. Barnett: A dislocation method for solving 3-D crack and inclusion problems in linear elastic solids
R. Bullough & J.R. Willis: Interactions of point defects and dislocations
F.R.N. Nabarro: Material forces and configurational forces in the interaction of elastic singularities
G. Herrmann: Material balance laws in one-dimensional strength-of-materials theories
K.J. Miller: Initiation and growth rates of short fatigue cracks
Thursday, April 5
L.M. Brown & S.L. Ogin: Role of internal stresses in the nucleation of fatigue cracks
R.P. Gangloff & R.O. Ritchie: Environmental effects novel to the propagation of short fatigue cracks
A.T. Winter: Cyclic deformation: the two phase model
Z.S. Basinski & S.J. Basinski: Surface geometry in fatigued copper crystals
K.J. Miller: Closing remarks

Papers not presented orally
G.I. Barenblatt & L.R. Bovina: Similarity methods in fracture
H.D. Bui: A path-independent integral for mixed modes of fracture in linear thermoelasticity
G.P. Cherepanov: Plasticity and creep mechanics from the viewpoint of the theory of elasticity

Poster session
J.A. Planell & F. Guiu: Cyclic deformation of molybdenum crystals at 400 K
R.S. Lakes: Experiments in Cosserat mechanics
J.E. Sinclair: Slip and cleavage from blunted cracks

K.J. Miller

2.


Scientific Committee
S. Eggwertz (Sweden), Co-Chairman
N.C. Lind (Canada), Co-Chairman
V.V. Bolotin (USSR)
O. Buxbaum (Germany FRG)
R.A. Heller (USA)
J. Hult (Sweden)
A.O. Payne (Australia)
A. Pugsley (England)
R. Talreja (Denmark)
T. Yokobori (Japan)

Short summary of scientific progress achieved
The purpose of the symposium was to bring together mathematicians developing the theory of stochastic processes and methods of reliability analysis, and engineers interested in applying these methods to model loads, strengths and structures. To honour the memory of Waloold Weibull, deceased in 1979, the opening ceremony included notes on his career and scientific work, and the first session was devoted to extreme value theory. One more mathematical session treated reliability analysis. Probabilistic failure models were discussed both for brittle and plastic materials, including also composites. Stochastic treatment of fatigue crack growth appears to be in rapid progress and was the subject of a large number of presentations. Other papers were concerned with applications of probabilistic fracture mechanics in the nuclear energy field. One rather extensive session described the structural linear and nonlinear response to random loading. The last session dealt with structures, especially in aircraft and buildings, including design philosophy, codes and certification.

At the end of this session the chairman presented a resolution originating from the Australian member of the Scientific Committee, meant to be sent to the international airworthiness organizations recommending a reliability based approach to fatigue substantiation. A majority of the participants agreed to the intent of the resolution and it was recommended that the resolution, after thorough review, be circulated among the members of the Scientific Committee for voluntary signing, and finally proceed to either ICAO or IATA, or both.

Only a few of the 55 contributed papers were distributed by post in advance. Some 50 per cent were available in larger or smaller numbers during the symposium.

Countries represented and number of participants
Australia.......................... 5 Italy.......................... 2
Austria.......................... 2 Japan.......................... 8
Canada.......................... 2 The Netherlands............. 1
Czechoslovakia............... 1 Norway.......................... 7
Denmark.......................... 5 Poland.......................... 2
England.......................... 4 Portugal.......................... 1
Finland.......................... 2 Romania.......................... 2
France.......................... 4 Sweden.......................... 40
Germany (FRG)............... 5 USA.......................... 19
India.......................... 1 USSR.......................... 1
Israel.......................... 2 Total.......................... 116

Publication of Proceedings
The Proceedings will be published by Springer-Verlag, Berlin (editors: S. Eggwertz and N.C. Lind) and are due to appear during 1985.

Financial support
Financial support, apart from the allocation of IUTAM, has been generously provided by the following companies:
Alfa-Laval AB
ASEA AB
Atlas-Copco AB
AB Bofors
Industry Group JAS:
- SAAB-SCANIA AB
- Ericsson Radio System AB
- FFV
- Volvo Flygmotor AB
Philips Elektronikindustrier AB
SANDVIK AB
Scandinavian Airlines System
AB SKF
STAL-LAVAL Turbin AB
and by the Aeronautical Research Institute of Sweden, FFA, responsible for the organization work.

SCIENTIFIC PROGRAMME

Tuesday, June 19

Opening Session
(Presiding: J. Hult and S. Eggwertz)
R.A. Heller: The Weibull Distribution Did Not Apply to its Founder.

Session 1. Extreme value theory
(Presiding: R. E. Barlow and Nancy R. Mann)
B. Epstein: Applications of Extreme Value Theory to Problems of Material Behavior.
E.H. Vanmarcke: Extremes of Local Averages of Random Fields.
S.C. Saunders: Some Problems of Estimation for Mixed-Weibull Populations which Arise in Fatigue or Strength Models.
G. Lindgren: The Use of Slepian Model Processes in Crossing and Extreme Value Theory.
J. Tiago de Oliveira: Weibull Distributions and Large Earthquake Modelling.

Session 2. Fatigue crack growth
(Presiding: H. Liebowitz and T. Yokobori)
K. Sobczyk: Stochastic Modeling of Fatigue Crack Growth.

Wednesday, June 20

Session 3. Probabilistic failure models
(Presiding: J. Carlsson and A.O. Payne)
V.V. Bolotin: Sets of Multiple Cracks in Solids with Application to the Fatigue Life and Reliability Prediction.
H.P. Lehrke: Fatigue Life and Reliability Estimation of Mineral-Oil Pipe Lines.
P. Stanley and E.Y. Inanc: An Assessment of Surface Strength and Bulk Strength of a Typical Brittle Material.
E. Simiu: Ring-on-Ring Testing and the Modeling of Cladding Glass Strength by the Weibull Distribution.
P. Bjerager: Lower Bound Reliability Analysis of Plastic Structures.
H. Mihasa: Stochastic Approach to Study the Fracture and Fatigue of Concrete.
L. Sentler: The Statistical Theory of Brittle Fracture Applied on Concrete.

Session 4. Probabilistic fracture mechanics
(Presiding: R.A. Heller and R. Talreja)
R.F. Cameron: Calculating PWR Pressure Vessels Failure Probabilities during Severe Accidents.
D. Munz and A. Brückner: Probabilistic Assessment of Structures with Weld Defects.

Session 5. Reliability Analysis
(Presiding: V.V. Bolotin and B. Bergmann)
R.E. Barlow: Combining Component and System Information in System Reliability Calculation.
B. Natvig: Recent Developments in Multistate Reliability Theory.
H.O. Madsen: Bayesian Fatigue Life Prediction.
R.H. Leicester: Closed Form Solutions for Cost Optimized Reliability.
J.L. Bogdanoff and F. Kozin: Dynamic Updating of Cumulative Damage Models for Reliability and Maintenance Based upon Service Information.

Thursday, June 21
Session 6. Structural response to random loads
(Presiding: O. Buxbaum and O. Ditlevsen)
M. Grigorii: Response of Linear Systems to Non-Gaussian Excitations.
I. Elishakoff and E. Lubliner: Random Vibration of Structures via Nonclassical Theories.
F. Casciati and L. Faravelli: Reliability Assessment for Non-Linear Random Frames.
B.A. Åkesson and T.L.E. Dahlberg: Reduction of Wind-Induced Vibrations by Use of an Optimal Dynamic Absorber.

Session 7. Structures: Design philosophy, codes and applications
(Presiding: N.C. Lind and L. Östlund)

IUTAM Symposium on the Influence of Polymer Additives on Velocity and Temperature Fields, 26-28 June 1984, Essen, FRG

Scientific Committee
B. Gampert (FRG), Chairman V.A. Ioselevich (USSR)
F. Durst (FRG) D. James (Canada)
H. Giesekus (FRG) G. Lumley (USA)
A. Gyr (Switzerland) O. Scrivener (France)
J. Hinch (England) I. Tani (Japan)

Short summary of scientific progress achieved
The symposium was concerned mainly with fundamental aspects relating to the influence of polymer additives on velocity and temperature fields in laminar and turbulent flow, in particular:
- the influence of molecular parameters of the polymers and solution properties, especially the elongational viscosity, on turbulent and porous media flow and flow with cavitation
- the influence of polymers on the turbulence structure in polymer drag reduction.

As chemists, physico-chemists, fluid dynamicists specialized in rheology and turbulence took part the conference had quite an interdisciplinary character as necessary for dealing successfully with the flow of polymer solutions. A systematic structure was given to the symposium by seven survey lectures which were the landmarks of the meeting.

Fortunately on all topics like extensional viscosity, molecular parameters and structures in turbulence ordinary papers of high quality were presented in addition to the survey lectures. Implications for the practical application of polymer additives resulting from an improved understanding of the basic mechanism were discussed.

As most of the scientists who were working on the subject successfully in recent years were present at the conference, the intentions of the Scientific Committee to take up the state of the art and to develop concepts in order to obtain further progress in the near future could be realized.

The last task was the topic of a very lively final discussion. It was intensively felt that further progress could be strongly supported by a further meeting.

Thus the wish appeared to have another conference on polymer solution flow in about three years.
Countries represented and number of participants
Canada ........................................ 1
CSSR ........................................ 1
France ....................................... 7
Germany (FRG) ................................ 34
England ...................................... 2
Holland ....................................... 2
India .......................................... 1
Israel ......................................... 1
Japan ........................................... 2
Korea (South) ................................ 1
Sweden ...................................... 1
Switzerland ................................... 1
USA ........................................... 16
USSR ......................................... 1
Yugoslavia ................................... 1
Total ......................................... 72

Publication of Proceedings
Springer Verlag, Berlin - Heidelberg - New York - Tokyo will publish a book containing the communications presented at the IUTAM Symposium (Editor: B. Gampert).

Financial support
Financial support of the symposium has been generously provided by the International Union of Theoretical and Applied Mechanics and by the following institutions:
- Universitä - Gesamthochschule - Essen
- Gesellschaft von Freunden und Förderern der Universität - Essen - Gesamthochschule e.V.

SCIENTIFIC PROGRAMME

Tuesday, 26 June
J.L. Lumley: "Turbulent drag reduction by polymer additives: a survey" - Invited Lecture -
D.F. James: "A review on extensional viscosity" - Invited Lecture -
L.G. Leal: "Flow-induced conformation changes in dilute polymer solutions - A comparison between non-ionic polymers and polyelectrolytes"
F. Durst, W. Interthal: "The nature of flow through porous media"
T. Lagerstedt: "An experimental study of polymer induced drag for flows through a porous medium"
J. Klein: "Molecular parameters as a basis for structure-property relations in the flow of polymer solutions" - Invited Lecture -
R.C. Chang, J.L. Zakin: "Drag reduction of non-ionic surfactant mixtures"
B. Gampert, P. Wagner: "The influence of molecular weight and molecular weight distribution on drag reduction and mechanical degradation in turbulent flow of highly dilute polymer solutions"
M.NM. Layec-Raphalen: "Influence of molecular parameters on laminar non-Newtonian and on turbulent flows of dilute polymer solutions"
L.I. Sedov, V.A. Loselevich, V.N. Pilipenko: "The peculiarities of the structure of wall turbulence and the mechanism of drag reduction by polymer additives"
R. Haas, W.-M. Kulicke: "Characterization of dilute polyacrylamide solutions by means of porous media flow"


Wednesday, 27 June
M.N. Layec-Raphalen, C. Wolff: "Some fringe effects of the flow on the macromolecules in dilute polymer and on their non-Newtonian behaviour" - Invited Lecture -
W.-M. Kulicke: "Aging of aqueous polymer solutions"
G.K. Patterson: "Model for effects of degradation on polymer drag reduction"
K. Walters: "Elastico-viscous effects in complex flows"
H.S. Lee, T.F. Irvine, Jr.: "Turbulence modeling and measurement with viscoelastic fluid flow in a rectangular open channel"
B. Falco: "A mechanism for polymer drag reduction"
H. Eckelmann: "The wall near structure of turbulent flow" - Invited Lecture -
H. Usui, N. Iwata, Y. Sano: "Statistical measurements in the turbulent flow of dilute drag-reducing polymer solutions in a round tube"
A. Gyr: "Vortices in drag reducing solutions: A hyper diffusion mechanism"
Y. Tomita: "Influence of polymer additives on neutral stability of Görtler vortices"
C. Elata: "Laser-Doppler measurements of vortex-shedding past small circular cylinders in dilute polymer solutions"
M.F. Hibberd: "Characterization of the turbulence and associated largescale structures in a plane mixing layer in water and a drag reducing fluid"

Thursday, 28 June
N.S. Berman: "A qualitative understanding of drag reduction by polymers" - Invited Lecture -
S. Penix, S. Lyons, C.A. Petty: "A statistical theory for turbulent drag reduction of a linear viscoelastic fluid"
R. Darby: "An engineering approach to modeling complex flow behavior of polymer solutions"
H.W. Bewersdorff: "Heterogeneous drag reduction in turbulent pipe flow"
B. Frings: "Annular injection of concentrated polymer solutions into the wall region of a turbulent pipe flow"
C. Maksimovic: "Turbulence structure of a developing duct flow with nearwall injection of drag reducing polymers"
J. Pollert: "Present and future industrial applications of drag reduction" - Invited Lecture -
O.H. Mahrenholz, R.U. Zimmermann: "Effects of a non-Newtonian fluid on the velocity distribution and pumping efficiency of peristaltic pumping"
D.H. Fruman, D. Bismuth, S. Affalo: "Effect of polymer solutions on tip vortex cavitation"
H.J. Rath, P. Desch: "The influence of polymer additives on the pressure
pulse propagation velocity in two-phase mixtures and on the cavitation thresholds"
A. Ambari, C. Deslouis, B. Tribollet: "Mass transfer in elongational flows of dilute polymer solutions"  
B. Gampert

Second IUTAM Symposium on Laminar-Turbulent Transition, 9-13 July 1984, Novosibirsk, USSR

Scientific Committee
N. N. Yanenko (USSR), Chairman, †
R. Eppler (FRG)
V. V. Kozlov (USSR), Scientific Secretary
M. Landahl (Sweden)
V. Ya. Levchenko (USSR)
J. Mathieu (France)
Eli Reshotko (USA)
W. S. Saric (USA)
J. T. Stuart (England)
I. Tani (Japan)

Short summary of the scientific progress achieved
The Second Symposium was devoted to experimental and theoretical studies of laminar-turbulent transition in fluids, i.e. the physical problems of transition and mathematical modeling in shear flows. A special emphasis was laid on fundamental mechanisms of the transition process.

Scientific Committee during the meeting on the 7th of September 1983 in Kyoto (Japan) verified the topics of Symposium:
1. Transformation of external disturbances into eigenoscillations of shear flows (Receptivity problem).
2. Development of disturbances in three-dimensional flows.
4. Interrelation of flow separation phenomenon and stability.
5. Transition peculiarities in supersonic and hypersonic flows.
6. Development of wave packets, "slugs, puffs" and turbulent spots in shear flows.
7. Control of transition phenomenon.
8. Transition in flight and comparison with results of wind tunnel studies.

The Scientific Committee has done a great work and selected 96 papers (13 among them – invited lectures) from 130 contributed ones. This quantity is due to a large number of highly qualified papers submitted for presentation.
The programme of the Symposium included 64 oral reports and 32 in the form of poster session presentation. Besides world-known authorities, poster sessions allowed a large number of young scientists in this field to participate in the Symposium.
The lectures and discussions clarified the current state-of-the-art in this field. Although understanding of the laminar-turbulent transition process is still far from complete, the papers presented demonstrated the pronounced progress achieved after the First Symposium. We are sure that the Symposium appeared to be useful for future research work of all the participants.
The Symposium was proposed to be in memory of the Chairman Professor N. N. Yanenko.

Countries represented and number of participants

<table>
<thead>
<tr>
<th>Country</th>
<th>Participants</th>
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<tr>
<td>USSR</td>
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<td>USA</td>
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<td>Switzerland</td>
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<td>Total</td>
<td>130</td>
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Publication of Proceedings
Springer-Verlag, Berlin
Financial support
USSR Academy of Sciences, IUTAM

SCIENTIFIC PROGRAMME

Monday, 9 July
Official opening

Session 1 (Chairman: R. Eppler)
A. D. D. Craik: Resonant interactions in shear flows (General lecture).
V. Ya. Levchenko: New experimental data on the boundary layer transition (General lecture).
T. Herbert: Secondary instability of plane shear flow-theory and applications (General lecture).

Session 2 (Chairman: V. N. Zhigulev)
I. I. Maslennikova, M. B. Zelman: On subharmonical type of laminar-turbulent transition in boundary layer.
L. Kleiser, E. Laursen: Three dimensional numerical simulation of laminar-turbulent transition and its control by periodic disturbances.
M. Lessen, P. H. Koh: Instability and turbulent bursting in the boundary layer.
N. A. Zheltukhin, N. M. Terekhova: The boundary layer structure in the transitional region.

Session 3 (Chairman: O. S. Ryzhov)
M. Gaster: On a non-linear transfer function description of wave growth in a boundary layer (General lecture).
Yu. S. Kachanov: Development of space wave packets in boundary layer.
L. Mack: Instability wave patterns from harmonic point and line sources in laminar boundary layers.
M. T. Landahl: The growth of instability waves in a slightly nonuniform medium (General lecture).

Session 4
(Chairman: M. A. Goldshtik)
R. Narasimha: Subtransitions in the transition zone.
C. Gasley, A. R. Wazzan: Control of water boundary layer stability and transition by surface temperature distribution.

Poster Session – 6

Tuesday, 10 July
Session 5
(Chairman: M. Landahl)
B. L. Rozhdestvensky: Secondary flows in the channels and pipes, their connection to and comparison with turbulent flows (General lecture).
M. Nishioka, M. Asai: 3-D wave disturbances in plane Poiseuille flow (General lecture).
M. P. Ramazanov: Development of finite-amplitude disturbances in Poiseuille flow.
M. A. Goldshtik, A. M. Lifschitz, V. N. Shtern: Threshold regimes in the plane channel flow.

Session 6
(Chairman: W. S. Saric)
V. N. Zhigulev: Problems of theoretical description of laminar boundary layer transition zone into turbulent one (General lecture).
P. Lechey: The receptivity of laminar boundary layer to external disturbances.
A. M. Tumin: Excitation of the instability waves by the localized vibrator in the boundary layer.
E. D. Terentiev: Linear problem on the vibrator in a subsonic boundary layer.

Session 7
(Chairman: W. S. Saric)
V. N. Zhigulev: Problems of theoretical description of laminar boundary layer transition zone into turbulent one (General lecture).
P. Lechey: The receptivity of laminar boundary layer to external disturbances.
A. M. Tumin: Excitation of the instability waves by the localized vibrator in the boundary layer.
E. D. Terentiev: Linear problem on the vibrator in a subsonic boundary layer.

Session 8
(Chairman: P. Lechey)
A. I. Ruban: On the Tollmien-Schlichting wave generation by sound.
G. V. Levina, A. A. Nepomnyaschy, A. A. Pozdeev: Resonance-induced oscillations in fluid with wave boundary motion.

N. F. Yurchenko, V. V. Babenko, L. F. Kozlov: The three dimensional disturbances control in a transitional boundary layer.

Poster Session - 8

Wednesday, 11 July
Session 9
(Chairman: T. Herbert)
O. S. Ryzhov: Viscous flow stability and separation (General lecture).
V. V. Kozlov: Interrelation of flow separation and stability (General lecture).
A. V. Dozgov: Evolution of vortical disturbances in flow with laminar separation.

Session 10
(Chairman: O. F. Vasilyev)
N. N. Yanenko, V. Ya. Ruddyak, A. N. Veretentsev: Shear layer stability investigation by the vortex particles method.
M. I. Rabinovich, M. M. Sushchik: The effect of external periodic fields on transition to turbulence in free shear flows (General lecture).
Yu. Q. Zhang, Ch. M. Ho, P. Monkewitz: The mixing layer forced by fundamental and subharmonic.
F. L. Jones, R. W. Miksad: Wave modulations and nonlinear interactions during transition to turbulence of a wake.

Session 11
(Chairman: M. Nishioka)
S. I. Ipatieva: Experimental investigation of a laminar-turbulent transition in free and semi-limited jet flow.
S. N. Savulescu: Stochasticity criteria for shear flow transition.
M. A. Goldshtik, E. M. Zhdanova, V. N. Shtern: Supercritical regimes in axisymmetrical submerged jets.

Thursday, 12 July
Session 12
(Chairman: V. Ya. Levchenko)
W. S. Saric, L. G. Yeats: Generation of cross-flow vortices in three-dimensional flow (General lecture).
K. M. Srivastava: Nonlinear interaction of streamwise vortices in nonparallel boundary layers on concave surface.
R. Mitchell, D. Arnal, E. Coustols: Stability calculations and transition criteria on 2- or 3-D flows.

Session 13
(Chairman: D. M. Bushnell)
N. Itoh: Stability calculations of the 3-D boundary layer flow on a rotating disk.
H. L. Reed: Wave interaction in swept wing flows.

Session 14
(Chairman: C. W. Van Atta)
R. Kobayashi, Y. Kohama: Vortices in boundary layer transition on a rotating cone.

Session 15
(Chairman: L. M. Mack)
S. A. Gaponov: On the development of disturbances in nonparallel supersonic flows.
A. D. Kosinov, A. A. Maslov: Development of artificially excited disturbances in supersonic boundary layer.

Poster Session – 10
Friday, 13 July

Session 16
(Chairman: M. I. Rabinovich)
C. W. Van Atta: Wall shear stress, surface pressure and coherent substructures in turbulent transition spots.
T. Matsui, M. Okude: Visualization of generation process of a turbulent spot.
V. S. Sadosky, G. I. Taganov: Model description of two kinds of organized structures dominating in the turbulent shear flow.

Session 17
(Chairman: B. L. Rozdestvenskaya)
S. N. Lukashchuk, V. S. Lvov, A. A. Predtechensky, A. I. Chernykh: First bifurcations in the circular Couette flow: laboratory and numerical experiments.
K. Bühler, J. Zierep: New secondary instabilities for high Re-number between two rotating spheres.

Session 18
(Chairman: J. Zierep)

V. I. Polezhaev, A. V. Bune, V. L. Gryaznov: Structure, characteristics of transition and of turbulence in the thermal convection given by the direct numerical modelling.
G. Z. Gershuni, E. M. Zhukhovitsky, A. A. Nepomnyaschy, I. B. Simanovsky: Development of disturbances and transition to turbulence at the convection in 2-layer systems.

Poster Session – 8

5.


Scientific Committee
Prof. M. Pichal (CSSR), Chairman
Prof. J. W. Dally (USA)
Prof. E. Durst (FRG)
Prof. A. Lagarde (France)
Prof. W. Merzkirch (FRG)
Prof. R. I. Soloukhin (USSR)
Dr. J. Träger (GDR)
Prof. J. Whitelaw (UK)

Short summary of scientific progress achieved
The objective of this Symposium was to provide an opportunity of exchange the information and ideas among scientists and engineers working in the dynamics of fluids and solids, using optical measuring methods. The contributions concerned the problems of experimental fluid flow (compressible fluid flow, transition, non-equilibrium phenomena interaction of fluid flow with bodies, high temperature flow) and of experimental mechanics of solids (propagation of stress waves in impact, fracture mechanism phenomena, nonstationary vibrations and nonstationary state of stress in materials).

Countries represented and number of participants
Brazil ........................................ 1 Japan ...................................... 4
China ........................................ 3 Netherlands .............................. 1
Czechoslovakia .............................. 35 Poland .................................. 2
Egypt ........................................ 2 Soviet Union ......................... 6
FRG .......................................... 12 UK ...................................... 1
France ....................................... 3 USA ..................................... 3
GDR .......................................... 2 Vietnam ................................ 1
Hungary ...................................... 3 Total ....................................... 79
Publication of Proceedings
The Proceedings are due to appear during first half of 1985, publisher: Springer-Verlag, Berlin (editor: M. Pichal).

Financial support
International Union of Theoretical and Applied Mechanics, Czechoslovak Academy of Sciences.
Institute of Thermomechanics, Czech. Academy of Sci.

SCIENTIFIC PROGRAMME

Tuesday, 18th September
Chairman: M. Pichal
M. Pichal: Optical methods in fluid and solid dynamics research.
A. Leipertz, J. Haumann, and G. Wu: Space resolved probing of gas concentration and temperature structures.
Y.M. Chen and F. Mayinger: Holographic interferometry studies of the temperature field near a condensing bubble.
A. Leipertz: Laser raman techniques for gas phase fluid dynamics and combustion research.

Chairman: A. Lagarde
K. Antropius and A. Paslerová: Holographic mode shape investigation of aircraft engine impellers.
J. Gardavský, J. Pšlek, V. Daněk and J. Máša: Experience with laboratory LDA by measuring flow fields in rotating turbomachinery.

Chairman: Franz Durst
M. Elena, J. Gaviglio: Experimental study of a turbulent boundary layers-shock wave interaction, using a monodimensional laser velocimeter.
M. Hrabovsky: Solution of diffuser inlet velocity field of radial impeller centrifugal turbine pumps by means of the LDA method.

Chairman: A. Mattiukas
A. Hencik and H. Gröning: Experimental studies of stress waves in elastic plates with curved boundary.

Wednesday, 19th September
Chairman: W. Merzich
J.M. Hodgkinson and J.G. Williams: Laser-doppler velocimetry applied to the impact testing of polymers.
N.A. Fomin, U. Wernekink, W. Merzich: Speckle photography of a turbulent density field.
B. Stříž, V. Humen, R. Vrzala: Experimentally and theoretically generated isochromatic fringe loops of cracks propagating at a constant velocity.
Hanna and Hanna: Stresses and deformation pattern investigated by the Moire optical method in gears.

Chairman: J. Träger
J. Beneš, H. Šebková: A new approach to evaluation of measurement in dynamic photoelasticity.
A. Lagarde, J.R. Blais, M. Cottion: Optimization of a stiffener to stop a crack propagation.

Chairman: D. Telionis
J. Ježek: Flow visualization in steel casting.
J. Swirydchuk: Behaviour of the vortex layer generated in the flow by an impulse change of circulation around a profile.
T. Drozd: The flow visualization on the turbulent boundary layer on the flat and cylindrical heated wall.

Chairman: T.V. Bazhenova
J.D. Chashechkin: Colour schlieren method.
B. Košík and J. Kozák: Photoelastic analysis of a seismoactive crack.
Friday, 21th September
Chairman: H. Zeller
P. Macura: Study of flow of metal and stress conditions at rolling by means of optical methods.
P. Šafařík, V. Vlček: Using interferometric measurements in calculation of aerodynamic forces.
J. Bláha: Laser beam monitoring of shock waves.

Chairman: S. Kotake
C.K. Zoltani and K.J. White: Tomography of transient events.
J. Balaš, M. Držík: Application of new photo-electric method to the measurement of dynamic stress intensity factor.

Chairman: J. Balaš
V.V. Golub, I.M. Naboko, A.M. Shulmeister: An investigation of impulse jet outflowing from multinozzle blocks by means of the schlieren installation.
H. Zeller and M.Zh. Tang: Karman vortex street in the supersonic wake a rough flat plate.
H. Eckelmann, V. Delitzsch: Migration of droplets under reduced gravity.

Chairman: M. Pichal
Final session, closing of the Symposium.

Other Meetings
The Bureau met in Lyngby, Denmark, on August 20 and 25, 1984.

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<td>Balance December 31, 1984</td>
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Statement of cash revenues collected and expenses paid for the year:
Cash revenues collected:
subscriptions | 47,863 |
allocation from ICSU | 12,256 |
interest income | 16,944 |
repayment symposia | 3,023 |
| | 80,086 |

Expenses paid:
Bureau meetings | 4,232 |
Congress Committee | 11,258 |
Symposia | 20,000 |
printing of Report 1983 | 2,227 |
contribution to ICSU | 929 |
contribution to Committee on Teaching of Science | 400 |
audit fees | 611 |
bank charges | 260 |
other | 254 |
| | 40,171 |

Excess of cash revenues collected over expenses paid for the year:
before gain (loss) from translation of other currencies into US dollars | 39,915 |
Gain (loss) from translation of currencies | (4,884) |
Excess of cash revenues collected over expenses paid for the year | 35,031 |

Congress Committee of IUTAM:
Statement of cash revenues collected and expenses paid for the year:

| | US $ |
| Balance 31 Dec. 1983 | 4,257 |
| Revenues | 42 |
| Expenses | 41 |
| foreign currency adjustment (loss) | (171) |
| Balance 31 Dec. 1984 | 4,238 |
| | 1,234 |
### STATEMENTS of movements on IUTAM bank accounts

(Internal transfer in parantheses)

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### Payment of Annual Dues

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### Bank Accounts of IUTAM

Treasurer: Prof. Dr. Ir. L. van Wijngaarden, T.H. Twente, Postbus 217, 7500 AE Enschede, The Netherlands.
Bank Mees & Hope NV, Oude Delft 165, 2611 HB Delft (Netherlands)
Deutsche Bank A.G., Filiale Darmstadt, D-6100 Darmstadt (FRG)
Assistant Treasurer: Prof. Philip G. Hodge, Jr., 107 Akerman Hall, University of Minnesota, Minneapolis, MN 55455, USA
Representation in other organizations

ICSU
Prof. J. Hult represents IUTAM in the Executive 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. W. Fizdon 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 represents IUTAM as an associate member of the International Commission on Acoustics under IUPAP.

SCOPE
Dr. F. N. Frenkel acts as Representative of IUTAM in the Scientific Committee on Problems of the Environment.

SCOR
Prof. T. B. Benjamin represents IUTAM in the Scientific Committee on Oceanic Research.

CTS
Prof. S. Berndt acts as Representative of IUTAM in the Committee on the Teaching of Science.

Donations in 1984

Donations given to IUTAM Symposia are recorded under the heading “Financial support” of the Reports of Symposia held in 1984.

Summary Record
of
the General Assembly of IUTAM
in Lyngby, Denmark, on 22 and 23 August 1984

The General Assembly was held in Room 1, Building 101, The Technical University of Denmark, Lyngby, Denmark. The meeting on 22 August started at 1400 hours, the meeting on 23 August started at 1900 hours.

Present were:
a) Representatives of adhering organizations

b) Elected members

c) Representatives of affiliated organizations
CISSM: (G. Bianchi); ICHMT: –; ICR: E. H. Lee; Euromech: L. van Wijngaarden; IAVSD: –; ISIMM: (W. T. Koiter); ICF: M. Hayes; ICM: J. Carlsson; AFMC: –.

d) Invited observers

e) Members represented by proxies
Canada: S. R. Swanson represented by B. Tabarrok
France: R. Legendre represented by A. Favre
Germany (FRG): E. Becker represented by H. Hornung
Germany (GDR): G. Schmidt represented by K. Hennig
Italy: D. Galletto and P. Villaggio represented by G. Bianchi
Professor Elie Carafoli of Roumania died in December 1983. He represented his country in our General Assembly since it joined the Union in 1956.

Prof. Folge Odqvist of Sweden died on 7 May 1984. He was the President of our Union from 1956 to 1960, and he had represented his country in the General Assembly since 1952. Up to his death he was a personal member of our General Assembly.

Professor Antoni Sawczuk of Poland died on 27 May 1984. He was the Rector of our Affiliated Organization, the International Centre for Mechanical Sciences in Udine, Italy, and he represented his country in our General Assembly since 1978.

Our sympathy and our grateful thoughts for their good work for our Union go to their families and to their nations.

I) National Adhering Organizations
An application to join IUTAM as a National Adhering Organization has been received from the Royal Irish Academy in Dublin. It will be discussed today under Item 7.

Applications for change in membership status have been received from Finland, the German Democratic Republic, India and Sweden. They will also be discussed today under Item 7.

A number of changes have been made in the personal representation of various National Adhering Organizations. They are recorded in my printed annual Reports for 1982 and 1983, which you have all received.

II) Affiliated Organizations
The International Association for Computational Mechanics has applied to become an Affiliated Organization. This application will be discussed today under Item 8.

III) Meetings of the Bureau
(1) First meeting
The Bureau met in Udine, Italy, on 25 and 26 June 1983. A summary record of that meeting was mailed to all members of the General Assembly shortly afterwards.

At this meeting the Bureau decided to propose a new formulation of Article XI in the Statutes of IUTAM, which relates to the composition and duties of the Bureau. This proposal will be discussed today under Item 10.

Furthermore the Bureau appointed the following members of the two Symposia Panels for 1984, viz.

Fluid Mechanics
Professor H. K. Moffatt (UK), Chairman
Professor J. P. Guiraud (France)
Sir James Lighthill (UK)
Professor R. Narasimha (India)
Professor L. I. Sedov (USSR)
Solid Mechanics
Professor W. T. Koiter (The Netherlands), Chairman
Professor S. H. Crandall (USA)
Professor P. Germain (France)
Professor G. Maier (Italy)
Professor H. Lipmann (FRG)
The Bureau also decided to propose that Professor M. Roy (France) and
Professor L. I. Sedov (USSR) be elected by the General Assembly as members
for the period 1984–1988 in view of their long and distinguished service to
IUTAM.
Finally the Bureau decided to support reelection of the present elected
members of the General Assembly for the same period.

(2) Second meeting
The Bureau met last Monday here in Lyngby. That meeting was mainly devoted
to the preparation of our General Assembly now in session.

(3) Third meeting
The Bureau will meet again on Saturday this week for the implementation of
decisions taken by the General Assembly. The newly elected members of the
Bureau will then also be present.
On that occasion the Bureau will decide the date and venue of its next annual
meeting, to be held in 1985. This will be reported to all of you in the minutes,
which will be distributed shortly afterwards.

IV) Symposia held
In all 13 IUTAM Symposia have been held since we met in Cambridge in
September 1982. Full accounts of the 12 symposia held in 1982 and the seven held
in 1983 are given in my printed annual Reports for 1982 and 1983.
In 1984 the following four symposia have been held so far:
IUTAM/ICF/ICM Symposium on Fundamentals of Deformation and Fracture.
J. Eshelby in memoriam (Sheffield, England).
IUTAM Symposium on Probabilistic Methods in the Mechanics of Solids and
Structures, W. Weibull in memoriam (Stockholm, Sweden).
IUTAM Symposium on the Influence of Polymer Additives on Velocity and
Temperature Fields (Essen, FRG).
IUTAM Symposium on Laminar-Turbulent Transition (Novosibirsk, USSR).
One more IUTAM Symposium will be held this year, viz.
IUTAM Symposium on Optical Methods in Fluid and Solid Dynamics (Liblice,
Czechoslovakia) 17-21 September.

V) Symposia in preparation for 1985
A total of ten IUTAM Symposia are scheduled for 1985, viz.
IUTAM Symposium on Mechanics of Damage and Fatigue (Haifa, Tel Aviv,
Israel) 1-4 July.
IUTAM Symposium on Aero- and Hydroacoustics (Lyon, France) 3-5 July.
IUTAM Symposium on Hydrodynamics of Ocean Wave-Energy Utilization
(Lisbon, Portugal) 8-10 July.
IUTAM Symposium on Macro- and Micromechanics of High Velocity Deformation
and Fracture (Tokyo, Japan) 12-14 August.
IUTAM Symposium on Mixing in a Stratified Fluid (Perth, Australia)
26-29 August.
IUTAM/IFToMM Symposium on Dynamics of Multibody Systems (Udine,
Italy) 15-21 September.
IUTAM Symposium on Single- and Multi-Phase Fluid Flow through Heterogeneous
Permeable Materials (Lower Hutt, New Zealand) 18-22 November.
IUTAM Symposium on Inelastic Behaviour of Plates and Shells (Rio de Janeiro,
Brazil) date not yet decided.
IUTAM Symposium on Interaction between Shock Waves and Turbulent Disipative
Layers (Paris, France) date not yet decided.
IUTAM Symposium on Thermal Shock (place and date not yet decided).
Further details on all these symposia as well as on those that will be decided to
be held in 1986 and 1987 will be given in a circular that will be distributed to all
members of the General Assembly later this autumn.

VI) Publications of IUTAM
Since I last reported to you in Cambridge the Proceedings of 13 IUTAM
Symposia have appeared in print, viz.
IUTAM/IUGG Symposium on Intense Atmospheric Vortices (Reading, UK)
14-17 July 1981. Proceedings, edited by L. Bengtsson and J. Lighthill, have
been published by Springer-Verlag, Berlin 1982.
IUTAM Symposium on Deformation and Failure of Granular Materials
(Delft, The Netherlands) 31 August – 3 September 1982. Proceedings, edited by
P.A. Vermeers and H. J. Lugere, have been published by A. A. Balkema,
Rotterdam 1982.
IUTAM Symposium on High Temperature Gas Dynamics (Liblice, Czechoslovakia)
15-19 September 1981. Proceedings, edited by M. Fichal, have been published
by the Institute of Thermomechanics, Czechoslovak Academy of Sciences,
Prague, Czechoslovakia, 1982.
IUTAM Symposium on Three-Dimensional Turbulent Boundary Layers (Berlin
West) 29 March – 1 April 1982. Proceedings, edited by H. H. Fernholz and
E. Krause, have been published by Springer-Verlag, Berlin 1982.
IUTAM/COSPAR Symposium on Impact Processes in Solid Bodies (Ottawa,
Canada) 21-22 May 1982. Proceedings, edited by J. A. M. McDonnell, have
been published in "Advances in Space Research" 8:2 (1982), 213-216.
IUTAM/COSPAR Symposium on Giant Planets and their Satellites (Ottawa,
Canada) 18-21 May 1982. Proceedings, edited by M. G. Kivelson, have
been published in "Advances in Space Research" 8:3 (1983), 1-111.
IUTAM/COSPAR Symposium on Fundamental Aspects of Material Science
in Space (Ottawa, Canada) 25-27 May 1982. Proceedings, edited by Y. Malmé-
jac, have been published in "Advances in Space Research" 8:3 (1983), 1-195.
IUTAM Symposium on Nonlinear Deformation Waves (Tallinn, Estonian


In several cases the Proceedings were published less than a year after the symposium was held. Efficient use of modern word processing systems should make it possible to shorten this time interval even more.

Since our last meeting my annual IUTAM Reports 1982 and 1983 have appeared in print. They have been distributed to all members of the General Assembly and also to a large number of persons and organizations with indicated interest in the activities of our Union.

In 1976 IUTAM had published a small brochure outlining the creation of IUTAM and its purpose and various activities. This brochure has been used to introduce our Union to people and institutions getting involved in IUTAM work. An updated edition of this brochure will be published in 1983.

Mr. President,

Before I conclude my report to this distinguished assembly I would like to express my deeply felt gratitude towards yourself and your colleagues in the Bureau. The eight years, during which I have been entrusted with this high office, have been marked by very meaningful work for a common cause, which has given me the greatest satisfaction. It has indeed been a great privilege to be part of this body and to enjoy a friendship that has deepened as the years have passed.

To all of you, colleagues and friends in the General Assembly, I wish to express my sincere thanks for your cooperation during my terms of office. From the very beginning I have been met with great confidence, and I shall cherish memories of helpful colleagues and friends in all parts of the world.

Thank you all!

The report of the Secretary-General was unanimously adopted.

**Item 3 – Report by the Treasurer**

The Treasurer, Professor E. Becker, had submitted the following report, which, in his absence, was read by the Secretary-General.

**Mr. President, dear Colleagues,**

At the General Assembly meeting in Cambridge (UK) in 1982 I had presented a survey of development of IUTAM financial affairs from 1976 to 1981. The following figures show the further development of IUTAM finances during 1982 and 1983; all amounts being given in USD.

<table>
<thead>
<tr>
<th></th>
<th>1982</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dues</td>
<td>34,903</td>
<td>37,128</td>
</tr>
<tr>
<td>ICSU contribution</td>
<td>10,039</td>
<td>10,141</td>
</tr>
<tr>
<td>Interests</td>
<td>18,531</td>
<td>13,894</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symposium</td>
<td>53,644</td>
<td>26,830</td>
</tr>
<tr>
<td>Business expenses</td>
<td>5,377</td>
<td>7,458</td>
</tr>
<tr>
<td>Contributions to ICSU and CTS</td>
<td>1,175</td>
<td>1,271</td>
</tr>
<tr>
<td><strong>Total assets (at the end of the year)</strong></td>
<td>60,356</td>
<td>35,029</td>
</tr>
<tr>
<td>Cash in banks</td>
<td>24,717</td>
<td>23,860</td>
</tr>
<tr>
<td>Time deposits</td>
<td>156,072</td>
<td>178,834</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>180,789</td>
<td>202,694</td>
</tr>
</tbody>
</table>

Our income derives from three sources: The largest part is the dues paid by our national adhering organizations. Second is our income from the interests on time deposits. In 1983 this income was considerably lower than in 1982, which caused a decrease of our total income from 63,453 in 1982 to 61,213 in 1983 despite the simultaneous increase of the dues. This reflects a drop in interest rates, particularly in the US, where we keep most of our interest-bearing deposits (interest rates are higher in the US than in Europe). The third part of our income, the contribution by ICSU was approximately the same in both years.

The bulk of our expenses goes into support of our symposia. The seeming discrepancy between the high amount of 53,644 in 1982 and the rather low amount of 26,830 in 1983 is easily explained: The allocations for two of the symposia which took place in 1983 had already been transferred in 1982 from our accounts to the respective symposia accounts; therefore they appear as expenses in 1982. The expense which I have lumped together under the item
"business expenses" comprise the following: Travel costs for the annual meeting of the Bureau and for the meetings of our various committees (e.g. Executive Committee of the Congress Committee), costs for printing our annual report, fee for the auditor of the annual financial report, bank charges and expenses for various small business items. The last part of our expenses are the contributions we pay to ICSU and the Committee on Teaching of Science (CTS).

I have broken up our total assets into cash in banks and time deposits. The cash in banks is available for our day to day business, the time deposits bear interests. It is clear that I have tried to keep as much money in interest bearing accounts as is possible without endangering the availability of money for our daily business. The percentage of cash in banks amounted to 6.1% of our total assets at the end of 1983. Our total assets increased by nearly 22000 from 1982 to 1983. This increase went totally to our interest bearing accounts. However, this rather cheerful state of affairs looks different if inflation is taken into account. At the last General Assembly meeting I had shown you the development of our finances if the dollar amounts were reduced to the dollar value in 1976, the reduction being effected by applying the OECD overall inflation rate. In 1976 our total assets stood at 126000. They had dropped to 114000 in 1981, and at the end of 1983 they stood at 111000 (all amounts adjusted to the 1976 dollar value). Hence the real value of our total assets has not changed much over the last seven years, it has slightly dropped. If our income and our expenses are also reduced to the 1976 dollar value, one can see that they remained about the same during these years. This, of course, means that despite the continuous increase of our dues we are just able to sustain the same amount of activity during each year.

If we don't want a reduction of our activities it is certainly necessary that we firmly stick to the principle of increasing our dues annually in accordance with the OECD overall inflation rate, a principle adopted by the General Assembly.

From the relevant OECD publication I have determined the average of this inflation rate for the two years 1982 and 1983 as 6.7%. This is a marked decrease from the 11% which we took as a basis for the last increase of the dues at our Cambridge meeting. I would like to mention that the latest trend shows a renewed increase of the inflation rate, and that the average for the European countries alone in 1982 and 1983 is 9%. Nevertheless, the overall rate of 6.7% has to be made the basis of our dues in 1986 and 1987. The unit of our dues for 1985 was fixed at the Cambridge meeting to 350 USD. Therefore the unit should be

372 USD for 1986
400 USD for 1987
or 386 USD for 1986 and 1987 for those organizations that prefer to pay the same amount in two consecutive years.

Let me conclude with the following remark: If you look at the figures of the table you will find that our surplus for 1983, that is the excess of income over expenses, amounts to 26184 USD. However the increase of our total assets in 1983 is only 21905. At first sight this discrepancy seems puzzling. The explanation (which repeats the explanation I had already given at our last meeting) is as follows: For our financial report all sums are converted to USD, although part of our assets are in Dutch Guilders and in German Marks. When the value of the dollar increases with respect to these currencies we incur a nominal loss, because the dollar value of that part of our assets which are in Guilders or Marks decreases. The last two years have brought a continuous rise of the dollar, and therefore we had always to register a nominal loss. This explains the discrepancy mentioned above.

More information can be gained from the detailed financial report which is published regularly as part of the annial IUTAM report.

Because my term as Treasurer ends this year I want to express my heartfelt thanks to all who supported me in my task. My particular gratitude goes to our President and our Secretary-General who were always ready with their assistance and their helpful advice.

The report of the Treasurer was unanimously adopted.

Item 4 - Preliminary discussion on annual dues
The recommendation given in the Treasurer's report was supported by the General Assembly. It was noted that a final decision regarding annual dues would be made in the second session of the General Assembly (see Item 15 below).

Item 5 - Report by the President on relations with ICSU
The representative of IUTAM in the General Committee of ICSU, Professor D. C. Drucker, reported that the 1984 meeting of the General Committee will take place 22 September, and the meeting of the General Assembly will take place 23-28 September, both meetings being held in Ottawa, Canada. For further details he referred to his statements in the IUTAM annual reports for 1982 and 1983.

Item 6 - Report by the Secretary of the Congress Committee
The Secretary of the Congress Committee, Professor B. A. Boley, reported on the final preparations for the XVI Congress now at work. For further details he referred to his statements in the IUTAM annual reports for 1982 and 1983.

A proposal for new members of the Congress Committee was presented. It was decided to make a final decision in this matter in the second session of the General Assembly (see Item 16 below).

A proposal for a change in the Rules of procedure of the Congress Committee was presented. It was decided to make a final decision in this matter in the second session of the General Assembly (see Item 16 below).

Item 7 - Matters concerning Adhering Organizations
(1) Ireland. An application for membership had been received from the Irish National Committee for Theoretical and Applied Mechanics, membership category I. The application was approved.
(2) **Finland.** The Finnish National Committee on Mechanics had applied for a change in membership status from category I to category II. The application was approved.

(3) **India.** The Indian National Committee for Theoretical and Applied Mechanics had applied for a change in membership status from category II to category III. The application was approved.

(4) **Sweden.** The Swedish National Committee for Mechanics had applied for a change in membership status from category II to category III. The application was approved.

(5) **Germany (GDR).** The Academy of Sciences of the German Democratic Republic had notified the General Assembly of a change in membership status from category III to category II.

**Item 8 – Matters concerning Affiliated Organizations**

An application for affiliation to IUTAM had been received from the International Association for Computational Mechanics (IACM). The statutes of IACM were available, and on recommendation of the Bureau the General Assembly decided to approve the application.

**Item 9 – Revision of Statutes of IUTAM**

The General Assembly decided to change the formulation of Article XI of the Statutes of IUTAM to the following, as proposed by the Bureau:

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 members of the General Assembly. 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 first, following the General Assembly at which they were elected.

The Bureau will meet at least every year. A member of the Bureau who is prevented from attending a meeting may by letter to the Secretary-General designate another member of the General Assembly as a replacement. The Secretary-General will act as a permanent center for all matters affecting the Union, including relations with adhering, affiliated, and other organizations.

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

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

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

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

The Vice-President shall normally fulfill the duties of the President should the President become unable to discharge them. Between meetings of the General Assembly the Bureau shall decide who shall undertake the duties of the Vice-President, Secretary-General, or Treasurer should a temporary replacement be necessary.

**Item 10 – Announcement by Electoral Committee concerning election of Bureau of IUTAM**

The Chairman of the Electoral Committee, Professor D.C. Drucker, reported on the work of the Electoral Committee and presented a slate of members of the Bureau for the period 1984–1988 proposed by the Electoral Committee. The final election of the new Bureau would take place in the second session of the General Assembly.

**Item 11 – Report by the Bureau on progress in work on the history of IUTAM**

The President, Prof. D.C. Drucker, reported on the present state of this project. A first draft of a short history of IUTAM had been prepared by Dr. Stephen Juhasz and was on display in the registration area of the XVI Congress. The General Assembly decided to complete the work in its present form and commissioned the Bureau to assist Dr. Juhasz in the editing.

**Item 12 – Preliminary discussion on future symposia**

The Secretary-General reported on the preparations made in this matter. A total of 18 proposals had been received from the members of the General Assembly, and these proposals had then been scanned by the two Symposia Panels. Preliminary reports of the panels had been sent to all members of the General Assembly. During a joint meeting of the two panels in Lynby on 19 August 1984 the proposals had been grouped into three categories according to the system first adopted in 1978 and followed since then.

The following proposals were given an *alpha* rating, indicating that the panels agreed that they were highly to be recommended:

- Turbulence management and relaminarization
- Boundary layer separation
- Non-linear water waves
- Fundamental aspects of vortex motions
- Nonlinear stochastic dynamical engineering systems
- Thermomechanical coupling in solids
- The electromagnetomechanical interactions in deformable solids and structures
- Yielding, damage and failure of anisotropic solids
- Multiaxial stress effects on fracture
- Fluid mechanics in the spirit of G.I. Taylor.

The following proposals were given a *beta* rating, indicating that the panels considered further discussion to be called for:

- Hydraulic transients
- Diffusion problems with phase boundaries
- Vibration damping in materials and members
- Application of multiple scaling to engineering problems in mechanics
Advanced boundary element applications in solid and fluid mechanics
Turbulent flow in open channels
The following proposals were given a gamma rating, indicating that the panels
would not now recommend a symposium to be held:
Pipe flow of liquid-solid and gas-solid mixtures
Dynamics of vehicles on roads and tracks.
The Chairman of the Fluid Mechanics Panel, Professor H. K. Moffatt and the
Chairman of the Solid Mechanics Panel, Professor W. T. Koiter, then gave
further comments on the various proposals and the reasons for the presented
grouping.
The General Assembly decided to change the rating from alpha to beta for the
following two proposals:
Non-linear water waves
Fluid mechanics in the spirit of G. I. Taylor.
The President, Professor D. C. Drucker, expressed the appreciation of the
General Assembly for the good work done by the two panels and their Chair-
men. It was decided to make a final decision on the 1986–1987 symposia pro-
gramme in the second session of the General Assembly.
The meeting then adjourned.

The meeting reconvened on 23 August.

Agenda 23 August
13. Continued discussion and final decision regarding future IUTAM
Symposia
14. Election of members of Symposia Panels
15. Continued discussion and final decision regarding annual dues
16. Election of members of the Congress Committee of IUTAM
17. Election of members of the General Assembly of IUTAM
18. Election of Officers and all members of the Bureau of IUTAM
19. Date and venue of the next General Assembly
20. Any other business.

Proceedings of the General Assembly

Item 14 – Election of members of Symposia Panels
As members of the Symposia Panels for the period 1984 through 1988 were
elected:
Fluid Mechanics
Prof. H. K. Moffatt, Chairman
Prof. A. Acivos
Prof. J. P. Guiraud
Prof. I. Imai
Prof. R. Narasimha
Solid Mechanics
Prof. S. H. Crandall, Chairman
Prof. P. Germain
Prof. H. Lippmann
Prof. G. Maier
Prof. M. Zyczkowski

Item 15 – Continued discussion and final decision regarding annual dues
Following the proposal made by the Treasurer, Professor E. Becker, (Item 3
above) the General Assembly decided the following amounts for the unit of
dues:
USD 372 in 1986
USD 400 in 1987
or USD 386 in 1986 and 1987 for those who prefer equal payments in the two
years.

Item 16 – Election of members of the Congress Committee of IUTAM
The following were elected as members of the Congress Committee for the
period 1984 through 1988:
L. Bevilacqua (Brazil)  I. Imai (Japan)
C. G. Chernyi (USSR)  A. Yu. Ishlinsky (USSR)
I. F. Collins (New Zealand)  H. K. Moffatt (UK)
D. C. Drucker (USA)  E.-A. Müller (FRG)
W. Fiszdon (Poland)  Lingxi Qian (China)
J. Hult (Sweden)
The following changes were decided to be made in the Rules of procedure for
the Congress Committee of IUTAM:
a) At end of Article 4 the following is added:
“4.5 the broad principles regarding financial arrangements for the
Congress.”
b) Article 5 should read as follows:
“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 immediately after the Congress.”

Item 17 – Election of members of the General Assembly of IUTAM
All elected members of the General Assembly were reelected. The General
Assembly then elected the following for the period 1984 through 1988:
Professor G. Batchelor (UK)  Professor M. Roy (France)
Professor F. I. Niordson (Denmark)  Professor L. I. Sedov (USSR)
Item 18 - Election of Officers and all members of the Bureau of IUTAM
The General Assembly elected the following as Officers and members of the
Bureau for the period 1984–1988, becoming effective on 1 November 1984:
President Sir James Lighthill (UK)
Vice-President Professor D. C. Drucker (USA)
Secretary-General Professor W. Schichlen (FRG)
Treasurer Professor L. van Wijngaarden (The Netherlands)
Members Professor P. Germain (France)
Professor J. Hult (Sweden)
Professor I. Imai (Japan)
Professor A. Yu. Ishlinsky (USSR)

Item 19 - Date and venue of the next General Assembly
On the invitation of the President-elect, Sir James Lighthill, the General
Assembly decided to hold its next meeting at University College London in
1986.

Item 20 - Other business
There was no other business, and the President closed the meeting.

Jan Hult, Secretary-General

Report
on
the activities of the Congress Committee during 1984

The principal event concerning the Congress Committee during 1984 was of
course the 16th International Congress of Theoretical and Applied Mechanics,
which was held at the Technical University of Denmark in Lyngby, on August
19–25. The Congress attracted 780 participants from 43 countries according to
the following distribution:

<table>
<thead>
<tr>
<th>Country</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>6</td>
</tr>
<tr>
<td>Austria</td>
<td>4</td>
</tr>
<tr>
<td>Belgium</td>
<td>11</td>
</tr>
<tr>
<td>Brazil</td>
<td>3</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2</td>
</tr>
<tr>
<td>Canada</td>
<td>32</td>
</tr>
<tr>
<td>China</td>
<td>37</td>
</tr>
<tr>
<td>CSSR</td>
<td>8</td>
</tr>
<tr>
<td>DDR</td>
<td>3</td>
</tr>
<tr>
<td>Denmark</td>
<td>175</td>
</tr>
<tr>
<td>Egypt</td>
<td>1</td>
</tr>
<tr>
<td>Fed. Rep. Germany</td>
<td>43</td>
</tr>
<tr>
<td>Finland</td>
<td>5</td>
</tr>
<tr>
<td>France</td>
<td>64</td>
</tr>
<tr>
<td>Greece</td>
<td>4</td>
</tr>
<tr>
<td>Holland</td>
<td>38</td>
</tr>
<tr>
<td>Hungary</td>
<td>3</td>
</tr>
<tr>
<td>India</td>
<td>3</td>
</tr>
<tr>
<td>Iran</td>
<td>4</td>
</tr>
<tr>
<td>Ireland</td>
<td>2</td>
</tr>
<tr>
<td>Israel</td>
<td>28</td>
</tr>
<tr>
<td>Italy</td>
<td>26</td>
</tr>
<tr>
<td>Japan</td>
<td>43</td>
</tr>
<tr>
<td>Mexico</td>
<td>2</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1</td>
</tr>
<tr>
<td>Norway</td>
<td>4</td>
</tr>
<tr>
<td>Poland</td>
<td>17</td>
</tr>
<tr>
<td>Portugal</td>
<td>1</td>
</tr>
<tr>
<td>USSR</td>
<td>11</td>
</tr>
<tr>
<td>USA</td>
<td>54</td>
</tr>
<tr>
<td>UK</td>
<td>182</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>780</td>
</tr>
</tbody>
</table>

The technical program included two novel features, namely poster/discussion
sessions and special sessions on three specific topics (i.e., micromechanics of
multicomponent media, marine-structure wave interaction and development
of chaotic behavior in dynamical systems). In order to assist the participants' reactions on these innovations, during the closing session, a questionnaire was
distributed posing the following three questions:
1. Should special-topic sessions (mini-symposia) be included in the next Congress?
2. Should poster sessions be included in the next Congress?
3. Did you participate in a poster session?
1. Should special-topic sessions (mini-symposia) be included in the next Congress?
2. Should poster sessions be included in the next Congress?
3. Did you participate in a poster session?
189 replies were received, with the following results:
Question 1 162 Yes 16 No
Question 2 & 3 144 replied YES to Qu. 2 and YES to Qu. 3
33 replied YES to Qu. 2 and NO to Qu. 3
4 replied NO to Qu. 2 and YES to Qu. 3
5 replied NO to Qu. 2 and NO to Qu. 3

The papers contributed to the Congress were evaluated by the International Papers Committee during a meeting in Lyngby on April 13-16, 1984. Accepted papers were divided for presentation either orally or through posters. The same standards of quality were applied in selecting papers for either type of presentation.
A total of 787 papers were submitted, of which 418 were finally presented,
235 orally, and 183 by poster. The IPC also advised on the distribution of travel
funds to younger participants and on the choice of session chairmen.
Two meetings of the Congress Committee (on Sunday, August 19 and on Fri-
day, August 24) were held in Lyngby during the Congress, in each case with 21
members present. In addition, two meetings of the Executive Committee were
held (on Sunday, August 19 and on Saturday, August 25).
The Congress Committee (CC) took the following actions:
1. It decided to propose to the General Assembly the following slate of candida-
dates for membership in the CC for a four year term, 1984–1988:
   L. Bevilacqua (Brazil)
   G.G. Cherny (USSR)
   I. F. Collins (New Zealand)
   D. Drucker (USA)
W. Fizdon (Poland)
J. Hult (Sweden)
I. Imai (Japan)
A. Ishinski (USSR)
K. Moffatt (UK)
E. A. Müller (FRG)
Lingxi Qian (L. H. Tsien) (China)
J. Singer (Israel)
In addition, the new President of IUTAM, J. Lighthill, becomes a member
of the Committee.
The Committee noted with sorrow the death, since the last meeting of the
Committee, of two of its members, namely Professors F. K. G. Odqvist and
N. N. Yanenko.
2. It elected the following Executive Committee for 1984–88:
J. Lighthill (Chairman)
K. Moffatt (Secretary)
B. A. Boley
W. Fizdon
F. Niordson
L. van Wijngaarden
3. It approved the list of Session Chairmen for the 16th Congress prepared by
the Local Organizing Committee (LOC) upon the recommendations of the
International Papers Committee (IPC). It also decided that, in the future,
the choice of Session Chairmen should remain one of the tasks assigned to
the IPC, with the understanding that the LOC would be empowered to
make final adjustments as necessary.
4. It chose the site and the dates for the 17th Congress of Theoretical and
Applied Mechanics as:
Grenoble, France
August 21–27, 1988
Prof. P. Germain will be the Chairman of that Congress.
5. The Congress Committee voted to recommend to the General Assembly a
change in the CC Rules of Procedure, so as to facilitate changes in the per
capita fee required to be levied at each Congress in order to defray the travel
expenses of the Executive Committee and of the International Papers
Committee. The wording eventually approved by the General Assembly for
Article 4 and 5 of the Rules of Procedure is incorporated in this Report.
6. The CC voted to recommend to the General Assembly (which eventually
approved the recommendation), that the per capita fee referred to in the
preceding item be set at $ 15 for the 17th Congress.
7. The CC voted to require future Congresses to include in their budget provi-
sion for travel support of young scientists from developing countries. It was
recommended that no less than $ 5000 be allotted for this purpose, with the
understanding that a higher figure would be highly desirable.

The next meeting of the Congress Committee was set for 1986 in conjunction
with the General Assembly meeting expected to be held then.

Bruno A. Boley

Report

on

relations with ICSU

The 1984 meetings of the General Committee and the General Assembly of
ICSU were held in Ottawa, Canada. They were remarkably harmonious
throughout the discussions of a number of controversial matters as well as several
new and somewhat uncertain directions.
As an experiment, three symposia were interspersed between meetings of the
General Assembly. One was a full day of presentations on Global Change.
Scientific perspectives were provided that ranged over the physical world from the
sun to the interior of the earth and the biological world of the atmosphere,
oceans, and land. Emphasis was placed on the poorly understood interdiscipli-
inary problems of interaction among the components of the entire system.
The two other symposia occupied a half day each. One was on the Teaching of
Science, the other on Gene Technology. No firm conclusions for future action
were anticipated or sought.
The Executive Board will establish an Ad hoc planning group on global change
to examine the interface problems and explore the desirability of a focused
interdisciplinary program for the 1990s. Such a program would supplement
rather than supplant existing programs. If one can be developed that appeals to
the biological Unions as well as to the physical, it will of necessity be a very
costly international venture requiring great financial and intellectual support
from many nations.

Much time was well spent at the meetings of the Subcommittee on Scientific
Priorities, the General Committee, and the General Assembly on the activity
and terms of reference of the Standing Committee on the Free Circulation of
Scientists and the Standing Committee for the Safeguards of the Pursuit of
Science. Free Circulation has had numerous successes in obtaining entry visas for
all bona fide scientists to attend Union symposia and other ICSU family meet-
ings. However, there have been several severe disappointments. To avoid any
such difficulty, India withdrew its invitation to host the General Assembly in
1986 and the invitation from Switzerland was accepted. India offered to host
the 1988 meeting by which time entry is expected to be guaranteed for all dele-
gates including those from countries with which India does not have diplo-
matic relations. Great emphasis was placed by the Committee on the need to
obtain assurance of free entry at the time of planning any ICSU or Union meet-
ing and to give early notice to the Committee on Free Circulation in the event
of any visa difficulties arising later. The problem of exit as well as entry visas to
attend ICSU family scientific meetings also is within the scope of the Commit-
tee which is cautiously optimistic that progress can be made. The Safeguards
Committee has not been as effective. It has issued excellent guidelines but finds itself unable to be of much assistance to individual scientists in their own country. The Executive Board will appoint an Ad hoc committee to consider how the objectives of the Safeguard Committee can most effectively be carried out in the future.

The new officers and ordinary members of the Executive Board are:

President: J. C. Kendrew (UK)
Vice-President: W. A. Rosenblith (USA)
Extraordinary Vice-President: G. K. Skryabin (USSR)
Secretary-General: L. Ernster (Sweden)
Treasurer: K. Thura (FRG)
Representatives of:
Space and Earth Sciences: R. West (IAU)
Physical Science and Math: W. E. Gordon (URSI)
Bio Sciences: P. Fasella (IUBS)
National Members: T. C. Tsao (Cao) (PRC)

Professor Jan Hult now takes over as the representative of IUTAM in the General Committee which meets every year in the General Assembly.

Daniel C. Drucker

Report
on
Committee on Space Research

The last, XXV, Plenary COSPAR Meeting and Associated Activities took place in Graz, Austria, 23 June – 7 July 1984. The program for the COSPAR meetings is growing at a rapid rate as seen by the 9 Symposia, 14 Workshops and 21 Topical Meetings held in Graz. They show the great extent of the fields studied in space and more than 800 participants proved the wide interest of the scientific community in space research and its potential technological applications. The recent publications in vol. 3 of the COSPAR Journal, Advances in Space Research concerning “The Terrestrial Upper Atmosphere” and “Fundamental Aspects of Material Sciences in Space” may be of interest to IUTAM Members.

The next XXVI COSPAR Meeting will be held in Toulouse, France on 30 June – 12 July 1986. Although no detailed plans for this meeting are yet available, between the submitted proposals, the following ones may be of interest:

- Solar Wind Interactions
- Structure and Dynamics of Planetary Atmospheres and Ionospheres
- Results and Developments of Material Sciences in Space
- Precise Orbit Computation
- Space Flight Results

The proposed Symposium on “The Origin and Evolution of Planetary and Satellite Systems” scheduled for Nov. 1986 may also be of interest.

As mechanical sciences are essential in many research areas of interest to COSPAR any proposals of the IUTAM community concerning our stronger participation addressed to your representative would be very welcome.

W. Fizzdon

Report
on
International Commission on Acoustics

The Commission met during 1984 in Leuven, Belgium on 5/6 April. The meeting was concerned primarily with planning the 12th International Congress of Acoustics to be held in Toronto, Canada from 24 July to 1 August, 1986. The venue will be the new Metro Toronto Convention Centre. There will be structured sessions, each of which will be introduced by an invited lecture of special character. Satellite Symposia accompanying the Congress will include one in Montreal on Speech Communication and two on the West Coast (one on Acoustics and Theatre Planning, and one on Imaging Acoustics and Underwater Sound). It was also agreed that the 13th Congress would be held in Belgrade, Yugoslavia in 1989; and that the Commission's new Chairman to succeed Professor R. T. Beyer (USA) would be Professor H. Myncke (Belgium).

J. Lighthill

Report
on
Committee on the Teaching of Science (CTS)

The activities of CTS, financed by grants from ICSU, the Unions and Unesco, and mainly aimed at helping solve educational problems in developing countries. A Newsletter is distributed free to a large number of countries. There is also a newsletter concerned specifically with Science Technician Training.

During 1984 the planning for the conference on “Science and Technology Education and Future Human Needs” has been progressing. It will be held in the Indian Institute of Science in Bangalore during 7-14 August 1985. The people responsible for the programs of the different topics of the Conference are as follows:

Health: Prof. G. Schaefer, Faculty of Education, University of Hamburg, Vou-Melle-Park 8, D-2000 Hamburg 13, FRG
Food & Agriculture: Prof. A. N. Rao, Faculty of Science, National University of Singapore, Lower Kent Ridge Road, Singapore 0511
Energy Resources: Prof. D. F. Kirwan, OEE, Physics Department, University of Rhode Island, Kingston, R.I. 02811, USA
Report on International Centre for Mechanical Sciences (CISM)

1. Courses and Seminars
The regular programme of courses and seminars planned by the Scientific Council for 1984, took place in the two Scientific Sessions, the Lagrange Session (June-July, 1984) and the Terzaghi Session (September-October, 1984). The topics, always at an advanced level, include different fields of mechanics and related computer sciences, both at a basic and applied level. Longer seminars of lectures sponsored by UNESCO were connected to some of the courses.

The Lagrange Session (June-July, 1984):
- Engineering Aspects of Solar Energy Conversion in Low and Medium Temperature Range;
- Applications of Tensor Functions in Solid Mechanics;
- Optical Methods in Mechanics. 3. Static and Dynamic Photoelasticity and Caustics: Recent Applications.

The Terzaghi Session (September-October, 1984):
- Mathematics of Multicriteria Optimization;
- Postgraduate Course on Computation Theory;
- Methods of Rock Engineering;
- Two-Phase Flows: Application in Power Machinery and Equipment.

2. Various International Events
Several meetings and Symposia were organized by CISM and held in Udine in 1984. The following ones were particularly noteworthy:

Conference on Abelian Groups and Modules (April 9-14, 1984)
The Conference was organized by CISM in cooperation with the Universities of Udine and Padova. The purpose of the Conference was an up-to-date survey of the actual state of world research in the field of Abelian Groups and Modules. General lectures held by the main speakers were followed by communications of participants on their latest results.

Seminar on the Training of International Engineers for European Industry: A Need and a Challenge (May 29-30, 1984)
The Seminar was organized in cooperation with SEFI (Société Européenne pour la Formation des Ingénieurs) and the University of Udine. The purpose of the Seminar was to look at the needs of industry relative to the training of "internationally minded" engineers, who not only should be aware of the impact of the growing internationalization of the industrial activity, but also capable of functioning efficiently within an international context.

5th CISM-IFToMM Symposium on Theory and Practice of Robots and Manipulators (June 25-28, 1984)
The organizers of this Symposium were CISM and the International Federation for the Theory of Machines and Mechanisms-IFToMM. These institutions have a common interest in furthering the mechanical sciences as applied to the theory of machines.
They have organized the Symposium to bring together the world's leading experts on the theory and practice of Robots and Manipulators technology. In order to encourage extensive interchanges between all participants, the attendance was limited.

3. Two International Seminars for Research and Education sponsored by UNESCO
Similarly as in the previous years (1973-1983), in the Summer and Autumn terms 1984, the following two Courses and Seminars for Research and Education sponsored by UNESCO were held at CISM. They were scheduled to be directly connected with corresponding courses of CISM’s Lagrange and Terzaghi Sessions. They were devoted to the following topics:

I. Mechanical Problems of Unconventional Energy Sources (June 12-22, 1984)

II. Methods of Rock Engineering (September 24 – October 5, 1984)
The above Seminars were mainly conceived to provide a fundamental and broader knowledge to those who are interested in research and engineering applications in the treated fields, especially in view of participants coming from developing countries. Each Seminar covered a two-week programme.

4. 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.
In 1984 the following books were printed:
K. Hutter - Hydrodynamics of Lakes
Th. Lehmann - The Constitutive Law in Thermoplasticity
G. Ausiello, M. Lucertini, P. Serafino - Algorithm Design for Computer System Design
A. Spencer - Continuum Theory of the Mechanics of Fibre-Reinforced Composites
O. Mahrenholtz - Dynamics of Rotors
The international journal for rapid publication “Mechanics Research Communications” (bimonthly), created by CISM and Pergamon Press, Oxford-New York in 1973, published in 1984 its eleventh volume. It contains scientific and applied communications on research related to a wide domain of Mechanics. The Journal, whose Editor-in-Chief is Professor B.A. Boley, plays an important role in implementing CISM’s aims and activities.

5. Scholarships
During the course a limited number of participants who were not supported by their own Universities, were granted free lodging and board by the Centre, 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 in UNESCO sponsored Seminars have been covered by UNESCO and partially by CISM.

6. International participation
In 1984, 45 lecturers from 10 countries delivered lectures in the CISM courses and seminars; these were attended by 212 participants coming from 29 countries. Besides, the international meetings organized by CISM were attended by numerous participants from European and extra European countries.

G. Bianchi

Report
on
International Centre for Heat and Mass Transfer (ICHMT)
The 1984 Advanced Course on “Fluidized Bed Combustion” was held on August 27 to 31, 1984, in Dubrovnik, Yugoslavia, under the directorship of Professor M. Radovanović, Twente University of Technology, the Netherlands. Also lecturing were: W. Draijer, G. Haaker, A. Kortleven, H. A. Masson, W. Prins, F. J. C. Rademacher, U. Spitsbergen, W. P. M. van Swaaij and M. Valk from the same University. The programme included fluidized bed combustors, feeders, stokers, limestone additions and storage as well as fundamentals of fluidization heat transfer, combustion, fuel circulation and segregation. The Course, sponsored by UNESCO, was attended by 40 participants from 8 countries. Lectures were available in form of preprints and will be published in 1985 by Hemisphere Publishing Corporation.
The Seventeenth ICHMT International Symposium sponsored by UNESCO was held on September 3 to 7, 1984, in Dubrovnik on the topic of “Heat and Mass Transfer in Fixed and Fluidized Beds”. The Scientific Committee co-chaired by Professors W. P. M. van Swaaij, Twente University, the Netherlands and D. Kunii, University of Tokyo, Japan, selected for presentation 46 papers in addition to 7 invited lectures. Topics covered included: Fundamentals, Fluid-Particle Transfer in Packed and Fluidized Beds, Fluidized Bed Combustion, Gasification and Special Processes, Liquid and Three-Phase Fluidization, Packed Bed Reactions, Special operations, modelling, measurements and applications. The Symposium was attended by 135 participants from 20 countries. All lectures and papers were available in a preprint form and a selection made by the Scientific Council will be published in the ICHMT proceeding series by the Hemisphere Publishing Corporation.
Two international meetings are being prepared by the ICHMT for 1985 under the sponsorship of UNESCO the Advanced Course and Symposium on the same topic of “High Temperature Heat Exchangers” The Course is directed by Academician A. E. Sheindlin, High Temperature Institute, Moscow, USSR and the Symposium Scientific Committee co-chaired by Professor Y. Mori, University of Electro-Communications, Tokyo, Japan and Academician A. E. Sheindlin. The meetings will be held from August 19 to 30, 1985 in Dubrovnik, Yugoslavia.

Z. Zaric

Report
on
International Committee on Rheology (ICR)
The IX International Congress on Rheology was held in Acapulco, Mexico, during the week of October 8-13, 1984, under the chairmanship of Professor Baltasar Mena, National University of Mexico. About 400 participants, representing 33 countries, presented 380 papers. Prof. Mena was elected ICR’s chairman for the next four years. Prof. N. W. Tschoegl, California Institute of Technology, was re-elected secretary for the same period.
The X International Congress on Rheology will be held in Sydney, Australia, in August or September, 1988. The exact date has not been determined yet. Prof. R. I. Tanner, Department of Mechanical Engineering, University of Sydney, will be the chairman of the Congress.

N. W. Tschoegl

Report
on
European Mechanics Committee (Euromech)
During 1984 the European Mechanics Committee organized the following Euromech Colloquia:
Euromech 177 4-6 June, Delft, The Netherlands: Mathematical modelling of sediment transport and morphology
Euromech 178 10-13 April, Bucharest, Romania: The mechanics of oil recovery
Euromech 179 18-22 June, Rimini, Italy: Waves in fluid-filled tubes
Euromech 180 4-6 July, Karlsruhe, Germany: Turbulence modelling for incompressible flows
Euromech 181 28-30 August, Stockholm, Sweden: Drag reduction through boundary layer control
Euromech 182 29-31 August, Brussels, Belgium: Mechanical characterisation of load-bearing fibre composite laminates
Euromech 183 24-27 September, Villetaneuse, France: Plasticity of crystalline media
Euromech 184 11-14 September, Cachan, France: The inclusion of local effects in the analysis of structures
Euromech 185 17-21 September, London, U.K.: Mathematical programming methods for the plastic analysis of structures
Euromech 186 17-19 September, Nancy, France: Rheology of biological fluids
Euromech 187 15-17 October, Göttingen, Germany: Adaptive wall wind tunnels and wall-interference correction methods
Euromech 188 24-26 September, Leeds, U.K.: Fluid loading and fluid-structure interaction
Euromech 189 18-20 October, Poznań, Poland: Elasticity coupled with thermal and electro-magnetic effects
Euromech 190 1-4 October, Hamburg-Harburg, Germany: Dynamical stability of inelastic structures.

H. H. Fernholz

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Report

on

International Association for Computational Mechanics (IACM)

During this year the International Association for Computational Mechanics finalized its constitution, developed membership to a level of approximately 250, and achieved affiliation with IUTAM. The first issue of a quarterly Bulletin was published. Plans were initiated for a Congress to be held in Austin, Texas in 1986. A temporary Council has handled the affairs of IACM to date; formal election of officers is planned to take place prior to the Austin Congress.

Richard H. Gallagher
ART. IV
Dans toutes ses décisions l'Assemblée Générale doit être guidée par la tradition de libre coopération scientifique internationale développée par les Congrès Internationaux de Mécanique Théorique et Appliquée.
En poursuivant ses objectifs, l'Union respecte le principe général de nondiscrimination et reconnaît le droit pour tout homme de science dans le monde d'offrir son adhésion ou son association à une activité scientifique internationale sans rencontrer d'opposition pour motif de race, de religion, de philosophie, politique, d'origine ethnique, de citoyenneté, de langage ou de sexe.

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 Assemblée 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 (ou 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.

ART. VI
L'Assemblée Générale se compose:
a) des représentants des "organisations adhérentes" (cf. art. VIII);
b) des membres élus par l'Assemblée Générale de l'Union et qui doivent être des personnes réellement engagées dans le travail scientifique concernant le Mécanique ou les sciences associées;
c) s'il y a lieu, des personnes élues par l'Assemblée Générale pour représenter des Comités ou Groupes désignés d'hommes de science.
La durée de fonction de tout membre élu doit être précisée, lors de son élection, par l'Assemblée Générale.

ART. VII
L'Assemblée Générale doit tenir à une représentation adéquate de tout groupe d'hommes de science poursuivant des recherches en Mécanique théorique ou appliquée et non représentés par une organisation adhérante.

ART. VIII
Les organisations d'hommes de science en Mécanique théorique ou appliquée (ou le unions de telles organisations) qui représentent effectivement une activité scientifique indépendante dans un pays ou dans un territoire délimité peuvent être admises dans l'Union par l'Assemblée Générale comme "organisations adhérentes" pourvu que leur dénomination exclue tout malentendu quant à la qualification du pays ou du territoire en cause.
En principe, une seule organisation pourra être admise pour chaque pays ou chaque territoire.

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 équivalent de l'organisation affiliée.
L'organisation affiliée et l'Union sont tenues de s'informer mutuellement de toutes leurs activités importantes et des mesures prises 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 sessions le travail de l'Union, l'Assemblée Générale élit les membres d'un Bureau pour une durée d'au plus quatre ans. Le Bureau est composé d'un Comité Directeur (un Président, le président élu qui remplit la fonction de Vice-Président, un Secrétaire Général et un Trésorier) et de quatre autres membres de l'Assemblée Générale.
Les membres, qui ne sont pas le Comité Directeur, ne peuvent être réélus plus de deux fois consécutives. 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 du Bureau pour le remplacer à cette session.

1) Adoptés par l'Assemblée Générale de l'Union le 21 August 1984 à Lyngby (Le Danemark).
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 si et pendant que celui-ci peut se trouver empêché de les exercer.

Entres les réunions de l’Assemblée Générale il incombe au Bureau de désigner un remplaçant temporaire lorsque nécessaire pour remplir les fonctions du Vice-Président, du Secrétaire Général ou du Trésorier.

**ART. XII**
L’Assemblée Générale établit son Comité permanent des Congrès chargé de l’organisation à intervalles réguliers du Congrès International 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 en tant qu’hommes de science en activité dans le domaine de la Mécanique théorique ou appliquée, sans être nécessairement des membres de 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 quelle doit acquitter sont déterminés, selon le tableau suivant, par la catégorie à laquelle désire appartenir l’organisation et qui a été approuvée par l’Assemblée Générale.

<table>
<thead>
<tr>
<th>Catégorie</th>
<th>Nombre de représentants</th>
<th>Nombre d’unités de la cotisation annuelle</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>1</td>
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<td>II</td>
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<td>3</td>
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<tr>
<td>III</td>
<td>3</td>
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<td>IV</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

Le montant de l’unité de cotisation annuelle est fixé par l’Assemblée Générale avec une année d’avance au moins sur l’année à laquelle cette cotisation devient exigible.

**Résolution de l’Assemblée Générale de Pallanza**
(27 juin 1950)

En confirmation des opinions exprimées précédemment à l’Assemblée Générale de septembre 1948 au moment où les présents statuts ont été adoptés:

1. L’Assemblée Générale estime que, dans les pays où il existe plus d’une organisation nationale active dans le champ de la mécanique théorique et appliquée, un comité spécial de coordination doit être formé. En général, il est convenu de reconnaître seulement une organisation adhérente dans chaque pays.

2. L’Assemblée Générale estime que sa composition devra être graduellement modifiée de façon à ce qu’elle comprenne principalement les représentants des organisations adhérentes à l’Union. La catégorie des membres élus devant être réservée aux cas particuliers et exceptionnels. Dans ce but, elle donne avis de son intention de réduire le nombre des membres élus lorsque, en 1952, ils seront arrivés au terme de leur mandat.

**Règles de fonctionnement du Comité des Congrès du IUTAM**

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 d’entreprendre toutes les actions nécessaires de sa part pendant la période qui s’écoule entre deux Congrès successifs, et de lui faire un rapport à sa prochaine réunion. Le Comité Exécutif comprendra 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 ou l’organisation qui invite, et ce Comité est également responsable de la publication des Comptes Rendus du Congrès. Le Comité d’Organisation fera son rapport au Comité des Congrès soit au cours du Congrès qu’il organise, soit avant, s’il le juge préférable.

4. Le Comité d’Organisation devra obtenir l’approbation du Comité des Congrès (normalement par l’intermédiaire du Comité Exécutif) pour toutes les
In pursuing its objectives the Union shall observe the basic policy of nondiscrimination and affirm the rights of scientists throughout the world to adhere to or to associate with international scientific activity without regard to race, religion, political philosophy, ethnic origin, citizenship, language or sex.

V

In voting every member of the General Assembly shall dispose of one vote. For an alteration of the Statutes the majority required is 2/3 of the votes brought forward.

For all other decisions a simple majority of the votes brought forward is required.

Any member who is unable to attend a meeting may by a letter to the Secretary General constitute another member of the General Assembly as proxy.

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

VI

The General Assembly is composed of:

a) representatives of the adhering organizations (Article VIII);
b) members elected by the General Assembly of the Union, who shall be persons actually engaged in scientific work in mechanics or in related sciences;
c) 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.

VII

The General Assembly shall provide for an adequate representation of any group of scientists carrying out research in theoretical or applied mechanics and not represented by an adhering organization.

VIII

Organisations of scientists in theoretical or applied mechanics (or unions of such organizations) which effectively represent independent scientific activity in a country or in a definite territory can be admitted by the General Assembly as adhering organizations of the Union provided they can be listed under a name that will avoid any misunderstanding about the country or territory represented.

In general only one organization from each country or territory will be admitted.

IX

Each adhering organization shall have representatives in the General...
Assembly of the Union, and pay an annual subscription to the Union in accordance with Article XIV.

X

International organizations mainly occupied in fields closely related to that of the Union can be admitted by the General Assembly as affiliated organizations of the Union.

Each affiliated organization has the right to appoint an observer, who is invited to take part in the General Assembly without voting rights. The Bureau of the Union (Article X) has the reciprocal right to appoint a nonvoting observer to the corresponding council or other executive body of the affiliated organization.

The affiliated organization and the Union are mutually obliged to keep each other informed about all important activities of and organizational measures taken.

In organizing international scientific meetings the Union and each of the affiliated organization are obliged to consider carefully all measures already taken by the Union and its affiliated organizations in order to coordinate such international scientific activities.

Affiliated organizations pay no annual dues to the Union.

XI'

To execute the decisions of the General Assembly and to carry out work between meetings, the General Assembly elects members of a Bureau for a period of at most four years. The Bureau consists of the officers (President, the retiring President who serves as Vice-President, Secretary-General, and Treasurer) and four other members of the General Assembly. 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.

1) Adopted by the General Assembly on August 22, 1984 in Lyngby (Denmark).

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

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

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

XII

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.

XIII

The financial means of the Union are formed by:

a) the annual subscriptions of the adhering organizations;

b) gifts and grants.

The Union shall maintain a roll of benefactors on which shall be inscribed annually the names of those persons or institutions which have accorded gifts, legacies or other subventions to the Union.

XIV

The number of representatives of an adhering organization and the amount of the annual subscription to be paid by that organization will be regulated according to one of the following categories, as proposed by the adhering organization and after approval of the General Assembly of the Union:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of representatives</th>
<th>Units of annual subscription</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>1</td>
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<tr>
<td>II</td>
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<td>IV</td>
<td>4</td>
<td>8</td>
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<tr>
<td>V</td>
<td>5</td>
<td>12</td>
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</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.
Resolution of the General Assembly at Pallanza
(June 27, 1950)

In confirmation of the views already expressed at the General Assembly of September 1948 when the present statutes were framed:

1. The General Assembly expects that in those countries where more than one national organization is active in theoretical and applied mechanics, a national coordinating committee will be formed. In general it is expected to recognize only one adhering body in each country;

2. The General Assembly believes that a gradual transition should be made in its composition, so that ultimately it will consist mainly of representatives of organizations adhering to the Union with the category of elected members reserved for exceptional and unusual cases. To this end it gives notices of its intention to reduce the number of elected members when the terms of the present elected members expire in 1952.

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-association, 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, preceding the one at which the new Bureau is elected, an Electoral Committee (EC) shall be elected, consisting of the President of the Union and two to four other members of the Assembly, who are not members of the Bureau.

2. The President is Chairman of the EC.

3. Proposals by members of the General Assembly with voting rights for members of the Bureau, viz. for President, Treasurer, Secretary-General, and the other four members to be elected, must be addressed to the Chairman of the EC within a time limit set by the Committee. All proposals will be treated confidentially by the Committee.

4. Taking into account all material received the EC is charged with the duty of presenting to the General Assembly such proposals as it deems will have at least a reasonable support by the General Assembly. The EC will make sure that the candidates thus proposed are willing to accept an election. The proposals by the EC will be circulated to all members of the General Assembly during the first session of the meeting of the Assembly at which the Bureau will be elected.

5. Proposals not identical with the ones of the EC are considered to be withdrawn, unless they are sustained and supported by at least ten members of the General Assembly before its second session.

6. The General Assembly will vote on those candidates mentioned in the proposals of paragraph 4 and 5.


List of Publications

a) Annual Reports, partially available at the Secretariat
   Report 1948
   Report 1949
   Report 1950
   Report 1951
   Report 1952
   Report 1953
b) Publications on Symposia, etc.:

   Published by: Central Air Documents Office, Army-Navy-Air-Force, UB Building, Dayton 2, Ohio, USA.


3. *Colloquium on Plastic Flow and Deformation within the Earth*, Hershey, Pennsylvania, USA, September 12-14, 1950, organized by IUTAM and IUGG.
   Published by the American Geophysical Union in the “Transactions American Geophysical Union”, vol. 32, no 4, pp. 497-543, 1951.
   A few copies can be obtained from the Secretary, American Geophysical Union, 1530, P. Street, N. W., Washington, D. C. (USA).


6. *2nd Symposium on Gas Dynamics of Interstellar Clouds*, Cambridge (UK), 1953, in cooperation with IAU.
   “Gas Dynamics of Cosmic Clouds, edited by H. C. van de Hulst and J. M. Burgers (IAU Symposium series, no 2), Amsterdam”.
   Published by North-Holland Publishing Company, Amsterdam (Netherlands), 1953.

   Published by Imprimerie Dioncre, Chaussée de Boondael, 602-602 a, Ixelles-Bruxelles (Belgium).

8. *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.

9. *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.

    Published by Reviews of Modern Physics, American Institute of Physics, 335 East 45th Street, New York 17, N. Y. (USA), 1958.

    Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1958.


13. *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.


56. 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.


94. IUTAM Symposium on High Temperature Gas Dynamics (Liblice, Czechoslovakia, 15-19 September 1981). The Proceedings of the Symposium, edited by M. Pichal, have been published by the Institute of Thermomechanics, Czechoslovak Academy of
INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

Proctor, have been published by The Metals Society, London 1984.


108. IUTAM/UGG 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.

c) Proceedings of the International Congresses for Applied Mechanics. 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.

1st Congress, Delft (Netherlands), 22-26 April 1924.


No more copies are available for sale at Delft.

2nd Congress, Zürich (Switzerland), 12-17 September 1926.


3rd Congress, Stockholm (Sweden), 24-29 August 1920.


AB. Sveriges Litografiska Tryckerier, Stockholm, 1931.


5th Congress, Cambridge (Massachusetts, USA), 12-16 September 1938.

6th Congress, Paris (France), 22-29 September 1946.
Proceedings not published (was given in the hands of Gauthier-Villars, Paris).

7th Congress, London (UK), 5-11 September 1948.

8th Congress, Istanbul (Turkey), 20-28 August 1952.
Proceedings published by the Organizing Committee (Vol. I, Vol. II). Faculty of Sciences, University of Istanbul, P.O. Box 245, Istanbul (Turkey), 1953.

9th Congress, Brussels (Belgium), 5-13 September 1956.

10th Congress, Stresa (Italy), 31 August – 7 September 1960.

11th Congress, Munich (Germany), 30 August – 5 September 1964.

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

13th Congress, Moscow (USSR), 21-26 August 1972.
The Proceedings, edited by E. Becker and G.K. Mikhailov, have been published by Springer-Verlag, (Germany), 1973.

14th Congress, Delft (The Netherlands), 30 August – 4 September 1976.


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