INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS

REPORT 1988

IUAM
University of Stuttgart
Federal Republic of Germany
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureau</td>
<td>2</td>
</tr>
<tr>
<td>Secretariat</td>
<td>2</td>
</tr>
<tr>
<td>Past Officers</td>
<td>2</td>
</tr>
<tr>
<td>Adhering Organizations</td>
<td>3</td>
</tr>
<tr>
<td>Affiliated Organizations</td>
<td>9</td>
</tr>
<tr>
<td>Members of the General Assembly</td>
<td>11</td>
</tr>
<tr>
<td>Members of the Congress Committee</td>
<td>12</td>
</tr>
<tr>
<td>Members of the Symposia Panels</td>
<td>13</td>
</tr>
<tr>
<td>Symposia</td>
<td>13</td>
</tr>
<tr>
<td>Other Meetings</td>
<td>39</td>
</tr>
<tr>
<td>Meetings co-sponsored</td>
<td>39</td>
</tr>
<tr>
<td>Treasurer’s Report</td>
<td>40</td>
</tr>
<tr>
<td>Representation in other organizations</td>
<td>43</td>
</tr>
<tr>
<td>Donations</td>
<td>43</td>
</tr>
<tr>
<td>Summary Record of the General Assembly</td>
<td>44</td>
</tr>
</tbody>
</table>

## Reports

- Report on the activities of the Congress Committee .......... 59
- Report on relations with ICSU                            ......... 61
- Report on Committee on Data for Science and Technology ... 62
- Report on International Commission on Acoustics           ......... 63
- Report on Committee on the Teaching of Science            ......... 63
- Report on International Centre for Mechanical Sciences    ......... 63
- Report on European Mechanics Committee                    ......... 66
- Report on International Society for the Interaction of Mechanics and Mathematics ... 67
- Report on International Association for Computational Mechanics ......... 67

## Statutes

- Statuts de l’Union Internationale de Mécanique Théorique et Appliquée .......... 68
- Résolution de l’Assemblée Générale de Pallanza ........... 72
- Règles de Fonctionnement du Comité des Congrès de l’Union .... 72
- Statutes of the International Union of Theoretical and Applied Mechanics .......... 73
- Resolution of the General Assembly at Pallanza ........... 77
- Rules of procedure for the Congress Committee of IUTAM .......... 77
- Procedure for the election of the Bureau of IUTAM .......... 78
- List of Publications                                      .......... 79
- List of Addresses                                          .......... 96
Bureau

The following members of the Bureau of IUTAM have been elected for the period 1 November 1988 to 31 October 1992:

Officers:
- President: Prof. P. Germain (France)
- Vice-President: Sir J. Lighthill (UK)
- Treasurer: Prof. L. van Wyngaarden (Netherlands)
- Secretary: Prof. W. Schiehlen (FRG)

Members:
- Prof. B. A. Boley (USA) (elected 1988)
- Prof. G. G. Chernyi (USSR) (1988)
- Prof. I. Imai (Japan) (1984)
- Prof. F. Ziegler (Austria) (1988)

Secretariat

IUTAM Secretariat
Institute B of Mechanics, University of Stuttgart
Pfaffenwaldring 9, D-7000 Stuttgart 80
Federal Republic of Germany
Telephone: (0711) 685-6388, Telex: 7255445 univd
Telefax: (0711) 685-6400 or (0711) 685-3500

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. Péres (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. Péres (France)</td>
<td>G. Temple (UK)</td>
<td>F. A. v. d. Dungen (Belgium)</td>
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<tr>
<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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<tr>
<td>1960</td>
<td>G. Temple (UK)</td>
<td>F. K. G. Odqvist (Sweden)</td>
<td>W. T. Koiter (USA)</td>
<td>M. Roy (France)</td>
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<tr>
<td>1964</td>
<td>M. Roy (France)</td>
<td>G. Temple (UK)</td>
<td>W. T. Koiter (Netherlands)</td>
<td>H. Görtler (Germany)</td>
</tr>
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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. Niordson (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. Niordson (Denmark)</td>
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<tr>
<td>1976</td>
<td>F. I. Niordson (Denmark)</td>
<td>H. Görtler (Germany)</td>
<td>D. C. Drucker (USA)</td>
<td>J. Hult (Sweden)</td>
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<tr>
<td>1980</td>
<td>D. C. Drucker (USA)</td>
<td>F. I. Niordson (Denmark)</td>
<td>E. Becker (FRG)</td>
<td>J. Hult (Sweden)</td>
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<tr>
<td>1984</td>
<td>J. Lighthill (UK)</td>
<td>D. C. Drucker (USA)</td>
<td>L. v. Wyngaarden W. Schiehlen (Netherlands)</td>
<td>(FRG)</td>
</tr>
</tbody>
</table>

Adhering organizations

Argentina (1959)
Asociacion Argentina de Mecanica Computacional,
Guemes 3450, 3000 Santa Fe
Chairman: Dr. S. R. Idelsohn
Representative: Dr. Mario Gadowczyk

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. B. L. Karihaloo
Representative: Prof. B. L. Karihaloo

Austria (1951)
Austrian National Committee for Theoretical and Applied Mechanics, Österreichische Akademie der Wissenschaften, Dr. Ignaz-Seipel-Platz 2, A-1010 Wien
Chairman: Prof. 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, Hertogsstraat 1, B-1000 Brussel
President: Prof. M. Crochet
Vice-President: Prof. J. Peters
Secretaries: Prof. M. Geradin, Prof. W. Sarlet
Representatives: Prof. P. Janssens, Prof. J. Kestens, Prof. P. van Moerbeke

Brazil (1982)
Associação Brasileira de Ciências Mecânicas, Pontifícia Universidade Católica, Rua Marquês de São Vicente, 225, 22453 Rio de Janeiro
President: Prof. S. Stuckenbruck
Representative: Prof. L. Bevilacqua

Bulgaria (1969)
Bulgarian National Committee for Theoretical and Applied Mechanics at the Bulgarian Academy of Sciences, "Acad. G. Bonchev" str. bl. 4, 1113 Sofia
President: Prof. St. Radev
Secretary: Assist. Prof. P. Parushev
Representatives: Assist. Prof. P. Parushev, Prof. St. Radev
Canada (1963)
The National Research Council of Canada, Ottawa, K1A OR6
President: Dr. L. Kerwin
Chairman of Canadian National Committee for IUTAM: Prof. B. Tabarrok
Representatives: F.P.J. Rimrott, Prof. B. Tabarrok, Prof. S.B. Savage,
Dr. S.R. Swanson

China (1980)
The Chinese Society of Theoretical and Applied Mechanics, Zhong Guancun
Beijing
Chairman: Prof. Zheng Zhemin
Representatives: Prof. Lin Tongji, Prof. Qian Lingxi, Prof. Wang Ren,
Prof. Zheng Zhemin
The Society of Theoretical and Applied Mechanics, 130 Kee-Lung Rd.,
Section 3, Taipei, Taiwan 107
President: Dr. Chun-Tsung Wang
Representative: Prof. G.J. Hwang, Prof. F.T. Sun

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

Denmark (1949)
The Royal Danish Academy of Sciences and Letters (Det Kongelige Danske
Videnskabernes Selskab), H.C. Andersen Boulevard 35, DK-1553 Copenh-
hagen V.
President: Dr. Erik Dal
Secretary: Prof. Dr. Thor A. Bak
Representatives: Prof. E.B. Hansen, Ass. Prof. P. Scheel Larsen

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

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

France (1949)
Comité National Français de Mécanique, Académie des Sciences, 23, quai
Conti, F-75006 Paris, France
President: Prof. Henri Cabannes
Secretary: Prof. A. Lagarde
Representatives: Prof. P. Germain, Prof. G. Iooss, Prof. G. Lespinard, Prof.
M. Roseau

Deutsches Komitee für Mechanik, Institut B für Mechanik, Universität
Stuttgart, Pfaffenwaldring 9, D-7000 Stuttgart 80
Chairman: Prof. Th. Lehmann
Representatives: Prof. K. Gersten, Prof. E. Krause, Prof. G. Kuhn, Prof.
W. Schiehlen

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. J. Altenbach, Prof. H. Günther

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

Hungary (1948)
Hungarian National Committee for IUTAM, Department of Mechanics, Technical
University Budapest, Műegyetem rkp. 3. H-1521 Budapest
President: Prof. János Szabó
Secretary: Prof. S. Kaliszyk
Representative: Prof. S. Kaliszyk

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. D.V. Singh
Secretary: Prof. V.H. Arakeri
Representatives: Prof. A.K. Gupta, Prof. R.N. Iyengar, Prof. Yogendra Nath
Ireland (1984)
Irish National Committee for Theoretical and Applied Mechanics, Royal Irish Academy, 19 Dawson Street, Dublin 2
Chairman: Prof. M. F. McCarthy
Secretary: Dr. J. A. Fitzpatrick
Representative: vacant

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

Italy (1949)
President: Prof. Giulio Maier
Secretary: Prof. Leone Corradi Dell' Acqua
Representatives: Prof. G. Bianchi, Prof. C. Cercignani, Prof. D. Galletto, Prof. C. Polizotto

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. K. Kawata, Prof. T. Tatsumi, Prof. Y. Yamamoto

Netherlands (1952)
Department for Mechanics of the Royal Institute of Engineers, Secr. Technische Hogeschool Eindhoven, WH 0. 130, Postbus 513, NL-5600 MB Eindhoven
President: Dr. G. Bartelds
Secretary: Dr. C. M. Menken
Representatives: Prof. J. F. Besseling, Prof. Dr. A.M.A.v.d. Heijden, Prof. L. van Wijngaarden

New Zealand (1979)
The Royal Society of New Zealand, P.O. Box 598, Wellington
President: Dr. T. Hatherton
Executive Officer: Mr. V. R. Moore
Representative: Dr. G. McVerry

Norway (1949)
The National Committee on Theoretical and Applied Mechanics of the Norwegian Academy of Sciences and Letters, Dept. of Mathematics, University of Bergen, N-5000 Bergen
President: Prof. M. S. Espedal
Representative: Prof. M. S. Espedal

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

Portugal (1968)
The Portuguese National Committee for Theoretical and Applied Mechanics, Instituto Superior Tecnico, 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)
Adhering organization: vacant
Representative: vacant

Saudi Arabia (1988)
King Abdulaziz City of Science and Technology, Office of the President, P.O. B. 6086, Riyadh 11442
President: Dr. S. Al-Athel
Representative: Dr. S. Al-Athel

Spain (1950)
The National Institute of Aerospace Technology "Esteban Terradas", Paseo del Pintor Rosales, 34, Apartado 8346, Madrid - 28008
Representative: Dr. M. Bautista Aranda

Sweden (1950)
Swedish National Committee for Mechanics, The Aeronautical Research Institute of Sweden, Box 11021, S-16111 Bromma
President: Dr. G. Drouge
Secretary: Dr. M. Svenzon
Representatives: Prof. S. Berndt, Prof. J. Carlsson, Dr. G. Drouge
**Switzerland (1950)**  
Board of the Federal Institutes of Technology  
(Eidgenössische Technische Hochschulen Zürich und Lausanne) ETH-Zentrum, CH-8092 Zürich  
Chairman: Prof. Heinrich Ursprung  
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, I.T.Ü. Kampüsü, Maslak, Istanbul  
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: Prof. J.T. Stuart  
Executive Secretary of the Royal Society: Dr. P.T. Warren  
Representatives: Sir James Lighthill, Prof. H.K. Moffatt, Prof. W.G. Price, Prof. J.T. Stuart, Prof. J.R. Willis

**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: Dr. H.N. Abramson  
Vice-Chairman: Prof. A. Acrivos  
Secretary: Prof. Philip G. Hodge, Jr.  
Representatives: Dr. H.N. Abramson, Prof. A. Acrivos, Prof. D.C. Drucker, Prof. L.B. Freund, Prof. P.G. Hodge Jr.

**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. G.G. Chernyi, Prof. K.V. Frolov, Prof. A.Yu. Ishlinsky, Prof. G.K. Mikhailov, Prof. I.F. Obraztsov

**Yugoslavia (1952)**  
Yugoslav Society of Mechanics, Kneza Milosa 9/1, 11000 Beograd  
President: Prof. B. Vujanović  
Secretary: Prof. D. Ružić  
Representative: Prof. D. Ružić

**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. S. Kaliszky, Prof. H. Lippmann, Prof. M. Sayir  
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. W. Rohsenow  
Secretary-General: Prof. N. Afgan  
Representative: Prof. N. Afgan  
Representative of IUTAM in ICHMT: Prof. L.I. Sedov

**ICR (1974)**  
International Committee on Rheology, Prof. D.F. James, Department of Mechanical Engineering, University of Toronto, Toronto Ont M5S 1A4, Canada  
Chairman: Prof. R.I. Tanner  
Secretary: Prof. D.F. James  
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. D.G. Crighton  
Secretary: Prof. H.H. Fernholz  
Representative: Prof. G.K. Batchelor  
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: Prof. L. Segel  
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. E. Kröner, Institute of Theoretical and Applied Physics, University of Stuttgart, Pfaffenwaldring 57, D-7000 Stuttgart 80, FRG
President: Prof. E. Kröner
Vice-President: Prof. G. Barenblatt
Secretary: Prof. W. Wendland
Representative: Prof. W. T. Koiter
Representative of IUTAM in ISIMM: Prof. P. Germain

ICF (1978)
International Congress on Fracture, Prof. T. Yokobori, Institute for Fracture and Safety, Doyah Building 802, 17-18 1-Chome Kamisugi, Sendai 980, Japan
Founder President: Prof. T. Yokobori
President: Prof. D. Francois
Secretary-General: Prof. T. Yokobori
Representative: Prof. T. Yokobori
Representative of IUTAM in ICF: Prof. J. Hult

ICM (1982)
International Congress on Mechanical Behaviour of Materials, Professor Minggao Yan, Institute of Aeronautical Materials, Beijing, China
President: Prof. Minggao Yan
Secretary: Dr. Xueren Wu
Representative: Prof. K. Miller
Representative of IUTAM in ICM: Prof. D. C. Drucker

AFMC (1982)
Asian Fluid Mechanics Committee, Professor H. Sato, Institute of Flow Research, 6-10-39-205 Akasaka, Minatoku, Tokyo, Japan
President: Prof. H. Sato
Representative: vacant
Representative of IUTAM in AFMC: Prof. I. Imai

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

Members of the General Assembly

Dr. H.N. Abramson (USA)
Prof. A. Acivos (USA)
§ Prof. N. Afgan (Yugoslavia)
Dr. S. Al-Athel (Saudi Arabia)
Prof. J. Altenbach (DDR)
Prof. E.R. de Arantes e Oliveira (Portugal)
*§ Prof. G. Batchelor (UK)
Dr. M. Bataista Aranda (Spain)
Prof. S. Berndt (Sweden)
Prof. J.F. Besseling (Netherlands)
Prof. L. Bevilaqua (Brazil)
*§ Prof. G. Bianchi (Italy)
Prof. S.R. Bodner (Israel)
* Prof. B.A. Boley (USA)
Prof. J. Carlsson (Sweden)
Prof. C. Cercignani (Italy)
Prof. G.G. Chernyi (USSR)
Prof. R.H. Dawoud (Egypt)
Prof. M. Dikmen (Turkey)
Dr. G. Drouge (Sweden)
* Prof. D.C. Drucker (USA)
Prof. M.S. Espedal (Norway)
* Prof. W. Fiszdon (Poland)
Prof. L.B. Freund (USA)
Prof. K.V. Frolov (USSR)
Prof. D. Galletto (Italy)
Prof. P. Germain (France)
Prof. K. Gersten (FRG)
Dr. M. Grudzowczyk (Argentina)
Prof. H. Günther (GDR)
Prof. A.K. Gupta (India)
Prof. W. Gutkowski (Poland)
Prof. E. Hansen (Denmark)
Prof. Z. Hashin (Israel)
Dr. A.M.A.v.d. Heijden (Netherlands)
Prof. P.G. Hodge, Jr. (USA)
* Prof. N.J. Hoff (USA)
* Prof. J. Hult (Sweden)
Prof. G.J. Hwang (China)
Prof. I. Imai (Japan)
Prof. G. Joos (France)
* Prof. A. Yu. Ishinsky (USSR)
Prof. R.N. Iyengar (India)
Prof. P. Janssens (Belgium)
Prof. S. Kaliszyk (Hungary)
Prof. B.L. Karihaloo (Australia)
Prof. K. Kawata (Japan)
Prof. J. Kestens (Belgium)
*§ Prof. W.T. Koiter (Netherlands)
Prof. A.N. Kounadis (Greece)
Prof. E. Krause (FRG)
Prof. V. Klupka (CSSR)
* Prof. Y.H. Ku (USA)
Prof. G. Kuhn (FRG)
Prof. G. Lespinard (France)
Sir James Lighthill (UK)
Prof. T.C. Lin (China)
Dr. G. McVerry (New Zealand)
Prof. G.K. Mikhailov (USSR)
Prof. M.J. Mikkola (Finland)
§ Prof. K. Miller (UK)
Prof. P. van Moerbeke (Belgium)
Prof. H.K. Moffatt (UK)
Prof. Yogendra Nath (India)
Prof. J. Nemec (CSSR)
* Prof. F.I. Njordson (Denmark)
Prof. I.M. Obraztsov (USSR)
§ Prof. H.B. Pacekja (Netherlands)
Ass. Prof. P. Parushev (Bulgaria)
§ Dr. J.R.A. Pearson (UK)
Prof. C. Polizzotto (Italy)
Prof. W.G. Price (UK)
Prof. L. Qian (China)
Prof. St. Radev (Bulgaria)
Prof. M.A. Ranta (Finland)
Prof. F.P.J. Rimrott (Canada)
Prof. M. Roseau (France)
Prof. D. Ružič (Yugoslavia)
Prof. J.I. Ryhming (Sweden)
Prof. S. B. Savage (Canada)
Prof. M. Sayir (Switzerland)

§ Representing Affiliated Organization
§§ Representing also Affiliated Organization.
Members of the Symposia Panels

The Bureau of IUTAM in 1977 set up two panels charged with the duty of scanning proposals made for IUTAM Symposia in the fields of fluid and solid mechanics. The following members have been elected in 1988 for the period up to and including the 1992 meeting of the General Assembly:

**Fluid Mechanics**
- Prof. A. Acivos (USA), Chairman
- Prof. K. Gersten (FRG)
- Prof. I. Imai (Japan)
- Prof. H. K. Moffatt (UK)
- Prof. R. Narasimha (India)

**Solid Mechanics**
- Prof. S. H. Crandall (USA), Chairman
- Prof. J. Achenbach (USA)
- Prof. G. Maier (Italy)
- Prof. J. Salençon (France)
- Prof. M. Życzkowski (Poland)

Reports of Symposia held in 1988

1.

IUTAM Symposium on Structural Optimization, 9–13 February, Melbourne, Australia.

**Scientific Committee**
- V. V. Bolotin (USSR)
- D. C. Drucker (USA)
- H. Eschenauer (FRG)
- E. Haug (USA)
- B. L. Karhilaoo (Australia), Co-Chairman
- G. Maier (Italy)
- Y. Murotsu (Japan)
- N. Olhoff (Denmark)
- G. I. N. Rozvany (FRG), Co-Chairman
- M. A. Save (Belgium)
- R. T. Shield (USA)
- C. A. M. Soares (Portugal)
- M. Życzkowski (Poland)

**Short summary and scientific progress achieved**

The objective of the Symposium was to bring together research workers who are actively engaged in the optimal design of structural systems. Particular emphasis was placed on layout and shape optimization but contributions from related fields were also invited.

In spite of the high cost of travel to Australia, the acceptance rate by invited speakers was unexpectedly high; this resulted in a large number of research papers (54) which is somewhat in excess of the number recommended by IUTAM guidelines.

It became clear during the Symposium that research into structural optimization is proceeding along two distinct but complementary lines: (a) discretized formulation (e.g., finite element, boundary element and finite difference techniques) combined with mathematical programming and (b) continuum and distributed parameter formulations (e.g., variational, control-theoretic and
function-analytic methods). Results by the latter group are useful in checking the limitations, validity and convergence of numerical methods and in providing a basis for assessing the efficiency of practical designs. The most important task of the continuum school, however, is the development of radically new and more efficient iterative methods (e.g. optimality criteria techniques) and computer algorithms for optimizing large structural systems, thereby supplementing the work being done by the numerical school.

Countries represented and number of participants

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Proceedings of the Symposium


Financial support

The following institutions have sponsored the Symposium:
IUTAM, The University of Sydney, Universität GH Essen, The National Committee for Theoretical and Applied Mechanics, Australian Academy of Science.

INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS 15

SCIENTIFIC PROGRAMME

Session A: Layout Optimization in Structural Design
Chairman: N. Olhoff, Co-Chairman: R. de Boer
W.S. Hemp: A Michell Type Criterion for Shells
P.G. Lowe: Optimization of Systems in Bending
M.P. Bendsoe: Composite Materials as a Basis for Generating Topologies in Optimal Shape Design

Session B: Shape Optimization I
Chairman: E. Polak, Co-Chairman: N.S. Khot
J. Sobieski: Structural Shape Optimization in Multidisciplinary Engineering System Synthesis
E. Sandgren & M. El Sayed: Shape Optimization: Creating a Useful Design Tool
P. Hajela & J. Jih: Boundary Element Methods in Optimal Shape Design – An Integrated Approach
W. Schiehlen: Optimal Shape of Pendulum Links
P. Pedersen: Shape Design for Minimum Stress Concentration
E. Schnack: Gradientless Shape Optimization with FEM

Session C: Numerical Methods
Chairman: J. Sobieski, Co-Chairman: Y. Murotsu
B.L. Karhaloo & S. Kanagasundaram: Comparative Study of NLP Techniques in Optimum Structural Frame Design
E. Polak: Minimax Algorithms for Structural Optimization
N. Olhoff: Solution of Max-Min Problems via Bound Formulation and Mathematical Programming
Y. Tada & H. Taketani: Boundary Element Approach to Optimal Structural Design Based on the Inverse Variational Principle
U. Ringertz: Discrete Continuous Structural Optimization
H. A. Eschenauer & P. Post: Optimization Procedure SAPOP Applied to Optimal Layouts of Complex Structures
H. A. Eschenauer: On Shape Optimization of Satellite Tanks

Session D: Expert Systems and Multicriterion Design
Chairman: O. Mahrenholtz, Co-Chairman: Y. Tada
N.S. Khot: Structural and Control Optimization for Space Structures
M. Balachandran & J.S. Gero: Development of a Knowledge-based System for Structural Optimization
W. Stadler & V. Krishnan: Natural Structural Shapes of Membrane Shells  
J. Koski, M. Lawo & R. Silvennoinen: Multicriterion Plate Optimization  
A. Pięura: Optimality Conditions for Multiple Loaded Structures: Integration of Control and Finite Element Methods

Session E: Safety, Dynamic & Stability Problems
Chairman: M. Zyczkowski, Co-Chairman: R.H. Pfaut  
L. Berke & N.S. Khot: Performance Characteristics of Optimality Criteria Methods  
R. de Boer: Optimization of Vibrating Thin-Walled Structures  
Y. Seguchi & S. Kojima: On the Shape Determination of Non-Conservative System: A Case of Column under Follower Force  
H. Yamakawa: Optimum Designs of Rotating Shaft Systems for Dynamic Nonlinear Responses  
J. Oda: On Optimality in Structural and Material Composition of Bamboo

Session F: Plates, Shells, Panels and Machine Systems
Chairman: J. Bäcklund, Co-Chairman: K. Schittkowski  
M.S. Anderson: Application of Optimization Methods to the Practical Design of Shear and Compression Loaded Stiffened Panels  
D. T. Young & R.H. Pfaut: A Variational Principle for Optimization Rectangular-Base Shallow Shells  
K. Yamazaki: Minimum Compliance Design of the Stiffener Layout of Thin Plates (Treated as Pseudocontinuum)  
D.P. Thambiratnam: Optimization of Conical Shells for Static and Dynamic Loads

Session G: Stochastic Methods and Miscellaneous Topics
Chairman: H.A. Eschenauer, Co-Chairman: E. Sandgren  
M. Zyczkowski: Optimal Design of Structures under Creep Conditions  
R.E. Melchers: Structural Optimization in a Non-Deterministic Setting  
L.M.C. Simões: A Mathematical Programming Approach for Finding the Stochastically More Relevant Failure Mechanism  
Y. Munotsu, M. Yonezawa & M. Kishi: Optimization of Frame Structures Based on Reliability Concept  
V. de Angelis: Linear Complementarity Problems: A cutting Plane Method Based on the Convex Hull of Polyhedra

K. L. Teo & C.-M. Wang: Optimal Shape of Least Weight Arches  
C.S. Gurujee & S.N. Agashe: Optimal Design of R.C. Frames Based on Improved Inelastic Analysis Method

Session H: Shape Optimization II
Chairman: P. Pedersen, Co-Chairman: P. Hajela  
J. Bäcklund: Shape Optimization of Holes in Shear Panels of Composite Materials  
B.J.D. Esping & D. Holm: Structural Shape Optimization Using OASIS  
F. Ellyin: Shape Optimization of Intersecting Pressure Vessels  
M. Cannarozzi, C. Cinquini & R. Contro: Optimal Shape of Cable Structures  
M. Yoshimura: Detailed Machine Structural Shapes Generated from Simplified Models  
R.D. Parbery: Optimization of a Hollow Beam-Shaft with Prescribed Inner Contour

Session J: Miscellaneous Topics
Chairman: W. Hemp, Co-Chairman: C. Cinquini  
A.J.G. Schoofs: Experimental Design and Structural Optimization  
K.-T. Cheng & F. Biao: Shape Optimization of Continuum with Cracks  
N. Banichuk: Modern Trends in Elastic-Plastic Design and Internal Structure Optimization  
M. Hýča: Optimization of the Cross-Section of Short Thin-Walled Beams subject to Bending and Shear with Allowance for the Shear-Lag Effect  
L.F. Jansen: Optimization of Structures using the Finite Element Method  
Yeh Kai-Yuan: New Approach to Structural Optimization by Analytical Methods

B.L. Karthalo and G.I.N. Rozvany

2.

IUTAM Symposium on Recent Advances in Nonlinear Fracture Mechanics, 14–16 March 1988, Pasadena, California, USA

Scientific Committee
B. Broberg (Sweden)  
L. B. Freund (USA)  
J. Hult (Sweden)  
W. G. Knauss (USA), Co-Chairman  
J. Lemaître (France)  
H. Miyamoto (Japan)  
H. Riedel (FRG)  
A. J. Rosakis (USA), Co-Chairman  
V.P. Tamuzh (USSR)  
J.R. Willis (United Kingdom)
Short summary of scientific progress achieved
The symposium covered a wide spectrum of areas within the discipline of nonlinear failure mechanics. Since this area represents a relatively new emphasis in solid mechanics, our goal was to provide an effective interaction forum for experimentalists, theoreticians and numerical analysts working in this area. A variety of different aspects of the field were covered. The 28 speakers discussed topics related to Damage Mechanics and Fracture, Continuum Theories, Materials Science Related, Microscopic, Theories of Failure, Dynamic Fracture Mechanics of Nonlinear Solids, as well as High Temperature and Viscoelastic Fracture. The speakers were given 35 minutes for their presentations. The discussions following each lecture, as well as the half hour of general comments which was planned after each session of four speakers, ensured a large number of stimulating comments. The status of current research activities in this area was thus critically reviewed and new directions and thrusts were successfully outlined.

Countries represented and number of participants

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Publication of Proceedings

Financial support
Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM).

SCIENTIFIC PROGRAMME

Session I: Viscoelastic and Viscoelastic Fracture Processes
Chairman: W.G. Knauss

J.L. Bassani: Crack Growth at High Temperature
V. Tvergaard: Creep Crack Growth by Degradation of Microstructure and Gain Boundary Cavitation
H. Riedel: Creep Crack Growth Under Small-Scale Creep Conditions
R.A. Schapery: On Some Path Independent Integrals and Their Use in Fracture of Nonlinear Viscoelastic Media

Session II: Cracks in Bimaterial Interfaces
Chairman: J.K. Knowles
M. Ortiz: Effects of Interface Decohesion and Sliding on Bimaterial Crack-Tip Fields (with J.A. Blume)
A. Needleman: An Analysis of Decohesion Along an Imperfect Interface
D.M. Parks: Elastic-Plastic Analysis of Contact at Bi-Material Interface Cracks (with E. Zywicz)
J.R. Rice: Crack Tip Fields in Ductile Crystals (with D.E. Hawk and R.J. Asaro)
Banquet at the Athenaeum (Hall of the Associates)
Speaker: Bruce E. Cain, Prof. of Political Science, „Problems and Issues of the Presidential Primary System“

Session III: Dynamic Fracture
Chairman: K.B. Broberg
S. Nemat-Nasser: Some Basic Issues in Dynamic Crack Growth (With M. Ohtaka)
R.J. Fields: Plastic Zone Formation Around an Arresting Crack (with R. de Wit)
M. Kanninen: Viscoelastic-Dynamic Crack Propagation, Experimentation and Analysis
L.B. Freund: Observations on High Strain Rate Crack Growth Based on a Strip Yield Model (with Y.J. Lee)

Session IV: Micromechanics and Damage Modelling (A)
Chairman: J.R. Willis
J. Lemaitre: Post-Processing of Crack Initiation
K.B. Broberg: Computer Demonstration of Crack Growth
H. Miyamoto: A Study on the Ductile Fracture in Al-alloys 7075 & 2017
R. McMeeking: Finite Element Results for Initially Spherical Holes Growing in Elastic-Plastic Materials

Session V: Characterization of Crack Tip Fields
Chairman: A.J. Rosakis
W.G. Knauss: Experimental High Resolution Determination of Crack Tip Deformation (with C. Schultheisz)
F.P. Chiang: Crack Tip Parameters and Elastic-Plastic Fracture of Metals (with B.C. Liu)
J. R. Willis: The Influence of Crack Size on the Fracture Behaviour of Short Cracks (with G. Harlin)
F. A. McClintock: Reduced Crack Growth Ductility due to Asymmetric Configurations

Session VI: Micromechanics and Damage Modelling (B)
Chairman: H. Riedel
R. Billardon: Numerical Approach of Crack Initiation by Continuum Damage Localization
V. P. Tamuzh: The Interaction of a Macrorack with a Damaged Zone
D. Krajcinovic: Deformation Process in Semi-Brittle Polycrystalline Ceramics (with A. Stojimirovic)
S. Suresh: Mechanics and Micromechanics of Fracture in Brittle Solids Under Cyclic Loads

W.G. Knauss and A.J. Rosakis

3.
IUTAM/IUPAP Symposium on Elastic Waves, 21-26 March 1988, Galway, Ireland

Scientific Committee
J. D. Achenbach (USA)  M. F. McCarthy (Ireland), Chairman
A. Bostrom (Sweden)    A. Morro (Italy)
M. M. Carroll (USA)    Y. H. Pao (USA)
P. Chadwick (U.K.)      M. Roseau (France)
A. T. de Hoop (Netherlands)  W. Schielen (Germany)
G. M. L. Gladwell (Canada)  H. F. Tiersten (USA)
M. A. Hayes (Ireland)    V. F. Zhuravlev (U.S.S.R.)
K. Kawata (Japan)       F. Ziegler (Austria)

Short summary of scientific progress achieved
The primary purpose of the symposium was to consider recent developments in elastic wave propagation. Since much progress has been made since the previous symposium in this topic (in 1977), a larger number of participants than is customary at IUTAM symposia was appropriate. In the event the number attending was one hundred and twenty four. There was an excellent mix of reports on developments in theoretical and experimental work in elastic waves, both linear and nonlinear, and in isotropic and anisotropic media. Sixty nine talks were delivered to which poster sessions with twenty eight contributions were added. All the speakers and poster presenters were selected and approved by the Scientific Committee. Fruitful discussions, well led by the session chairmen, took place after each talk and the poster sessions. An overview session on Wave Propagation in Complex Systems was extremely well received and led to much stimulating discussion. The fact that most of the participants stayed in the same hotel made for very good discussions over meals and at the many social occasions. The proceedings of the symposium reflect much of the current state of experimental, computational and theoretical work in elastic wave propagation. It was a very stimulating meeting.

Countries represented and number of participants
Australia ......................... 1  Mexico ......................... 1
Austria ........................... 3  Netherlands .................. 10
Belgium ........................... 1  Norway ......................... 2
Canada ............................ 3  Poland ......................... 5
Denmark ........................... 1  China (Taipei) .............. 3
France ............................. 12  Sweden ....................... 4
Greece ............................. 1  Switzerland .................. 1
Ireland ............................ 10  U.K. ......................... 20
Israel ............................. 2  U.S.A. ...................... 31
Italy .............................. 6  W. Germany ................ 2
Japan .............................. 5  Total .................... 124

Publication of the Proceedings
The proceedings are to be published by Elsevier-North Holland, with Professors M. F. McCarthy and M. Hayes as editors, the publication date to be about November 1988.

Financial Support
International Union of Theoretical and Applied Mechanics, International Union of Pure and Applied Physics, United States Office of Naval Research, Royal Irish Academy, University College, Galway.

SCIENTIFIC PROGRAMME

Session I:  (Co-Chairmen: M. M. Carroll, J. N. Flavin)
Chadwick, P.: Recent Developments in the Theory of Elastic Surface Waves
Borejko, P., Ziegler, F.: Pulsed Cylindrical Elastic Waves in A Half-Space with a Dipping Surface Layer
Johnson, G.C.: The Influence of Applied Stress on the Response of Thin Films
Rossmanith, H.P.: The Caustic of a Rayleigh-Wave
Mal, A.K.: Elastic Waves in Layered Media with Interface Features
Hirao, M., Fukuoka, H.: Ultrasonic Propagation in Textured Polycrystalline & Metals
Dieulesaint, E., Royer, D.: Probing of Acoustic Wave Surface Displacements

Session 2: (Co-Chairmen: P.M. Nagahi, F. Ziegler)
Parker, D., David, E.: Spreading of Nonlinear Surface Waves on Piezo-Electric Solids
Nagahi, P.M. & Carroll, M.: Dynamic Solutions in Second Order Elasticity
Fu, Y.B. & Scott, N.: The Evolution Law of One-Dimensional Weak Shock Waves in Elastic Non-Conductors
Christiansen, P.L., Soerensen, M.P.: Solitary Waves on Nonlinear Elastic Rods

Session 3: (Co-Chairmen: G.A. Maugin, D.M. Barnett)
McCoy, J.J.: Propagation Modelling Based on Wavefield Factorization and Path Integration
Braga, A.M.B., Herrmann, G.: Wave Propagation in Submerged Layered Composites
Green, W.A.: Stress-Wave Propagation in a Laminated Sandwich Plate
Pierce, A.D.: Wave Propagation and Excitation on Thin-walled Elastic Cylinders
Bogy, D.B.: Elastic Wave Scattering from an Interface Crack in a Layered Half-Space Submerged in Water
Jensen, F.B., Schmidt, H.: Nonspecular Reflection of Bounded Acoustic Beams from Layered Viscoelastic Halfspaces
Kooij, B.I.: Scattering of Point-Source Generated Transient Elastodynamic Waves by a Semi-Infinite Void Crack in a Half-Space


Session 4: (Co-Chairmen: W.A. Green, L.M. Brock)
Burridge, R., Chang, H.-W.: Multimode Wave Propagation in a Highly Discontinuous Medium
Pao, Y.-H., Ziegler, F.: Wave Propagation from a Point-Source in a Wedge-Shaped Layer on Top of a Half Space
Wickham, G.R.: Calculating waves in elastic wedges
Bamberger, A., Dermentjian, Y., Joly, P.: Mathematical Analysis of the Propagation of Guided Waves in Elastic Heterogeneous Media
Brazier-Smith, P.R.: Scattering at the Join of Fluid Loaded Co-Planar Half-Plane Plates

Poster Session A (Chairman: P. Quinlan)
Ha-Duong, T.: On the First Kind Boundary Integral Equation for the Penny-shaped Crack Problems
Hosten, S., Basta, S.: Ceramic-Ceramic Composites High Temperature Characterization
Hsiao, G.C., Wendland, W.I.: Exterior Boundary Value Problems in Elastodynamics
Kitahara, M., Nakagawa, K.: Born Series Approach Applied to Three Dimensional Elastodynamic Inclusion Analysis by BIE Methods
Kosinski, W.: Elastic and Viscoelastic Waves in Temperature-Rate Sensitive Media
Molina, C., Pustrone, F.: Wave Propagation in Thin Elastic Bodies
Sugimoto, N.: Steady Propagation of Buckle in Elastic Pipelines
Yang, H.-J.: Coupled Flexural-Longitudinal Wave Motion of a Periodically Supported Layered Beam

Session 5: (Co-Chairmen: A.T. de Hoop, G. Herrmann)
Ghaleh, M.J., Piau, M.: Vibrations of a Point-Impacted Infinite Elastic Plate Interacting with a Fluid
de Vries, S.: Elastodynamic Radiation from an Impulsive Point Source in a Poroeelastic Fluid/Solid Medium
Alkmade, J.A.H., de Maag, J.W.: Direct Inversion for a Layered Elastic Medium

Poster Session B (Chairmen: A.T. de Hoop, G. Herrmann)
Bostrom, A., Datta, S.K., Olsson, P.: Ground Motion Amplification on Alluvial Valleys
Carroll, M.M., McCarthy M.F.: Finite Amplitude Wave Propagation in Magnetized Perfectly Electrically Conducting Elastic Materials
Codegone, M.: Elastic and Thermoelastic Scattering Problems and Non-Homogeneous Media
Dunwoody, J.: Elastic Interfacial Standing Waves
Hall, W.S., Robertson, W.H.: Advanced Boundary Element Calculations for Elastic Wave Scattering
Koczak, Z.: Long Waves in a Fluid Saturated Porous Anisotropic Layer Resting on a Heterogeneous Elastic Half-Space
Lee, S.Y., Chin, Liang, C., Huey, J.Y.: Coupled Thermoelastic Waves in Periodically Laminated Plates
Mainardi, F., Vitali, G.: On Transient Waves in a Porous Elastic Solid
Nakano, M.: A Practical Method to Measure the Depth of Cracks in Concrete Structure using Diffracted P Waves
Planet, M., Zhang, Y.: Ray Approximation and Caustics Formation inside an Anisotropic Elastic Half-Space
Pouget, J.: Dynamics and Stability of Twin Boundaries in Martensitic Transformations
Quak, Dirk: Time-Domain Born Approximation to the Far-Field Scattering of Plane Elastic Waves by a Penetrable Object
Quentin, G., Talmant, M.: The Plane Plate Model Applied to the Scattering of Ultrasonic Waves from Thin Cylindrical Shells

Session 6: (Co-Chairmen: R. Burridge, A. Bostrom)
Gaunaurd, G.C.: Resonant Acoustic Scattering from Underwater Elastic Bodies

de Hoop, A.T.: Time-Domain Reciprocity Theorems for Elastodynamic Wave Fields in Media with Relaxation
Meister, E., Speck, F.O.: Elastodynamic Scattering and Matrix Factorization
Olsson, P., Bostrom, A., Datta, S.K.: Scattering of Elastic Waves by Inclusions surrounded by Thin Interface Layers
Werby, M.F., Gaunaurd, G.C.: Resonances in the Backscattered Echoes from Elastic Shells near an Interface
Olsson, P., Bostrom, A.: Dynamical Stress Intensity Factors for 3D. Non-Planar Cracks
Coates, R.T., Chapman, C.H.: Beyond the Born Approximation
Kuo, M.K., Achenbach, J.D., Yang, H.J.: The Effect of Near-Tip Residual Cohesive Tractions on Tip-Diffracted Fields

Session 7: (Co-Chairmen: A. Mal, J.J. McCoy)
Corones, J.: Direct and Inverse Scattering for Transient Elastic and Viscoelastic Media
Beltzer, A.I.: Effects of Scattering and Viscoelastic Losses on Wave Propagation in Random Media
Sayers, C.M.: Elastic Wave Propagation through Anisotropic Microcracked Rocks
Peterson, L.: Elastic Wave Scattering by Two Penny-Shaped Cracks

Session 8: (Co-Chairmen: J. Dunwoody, D. Frit)
Norris, A.N.: Gaussian Wave Packets in Anisotropic Elastic Solids
Harris, J.G.: The Excitation and Propagation of Very Directional Elastic Wavefields
Ziv, M.: Solution to Multi-Dimensional Wave Propagation Problems in Solids by the Method of Characteristics
Sayir, M.: Coupling Effects in Structural Wave Propagation
Brock, L.M.: Exact Solutions for Dynamic Problems of Crack Propagation - Dislocation Motion Interaction
Chen, P.J., Moro, A.: Induced Discontinuities in Materials with Internal State Parameters
Aron, M., Craine, R.E.: Estimates for Dynamical Solutions in Finite Thermoelasticodynamics
Schoenberg, M., Muir, F.: Group Theoretic Formulation for Elastic Properties of Media Composed of Anisotropic Layers
Session 9:  (Co-Chairmen: P. Chadwick, K. Kawata)
Tiersten, H.F.: Electroelastic Nonlinearities, Biasing Deformations and Piezoelectric Vibrations
Maugin, G.A.: Nonlinear Wave Phenomena in Magnetostrictive Elastic Bodies
Dost, S.: Acceleration Waves in Elastic Dielectrics with Polarization Inertia
Green, R.E.: Electromagnetic Wave Study of Elastic Wave Propagation in Solids
Nowacki, J.P.: Electromechanical Waves in Elastic Dielectric
M.F. McCharty

IUTAM Symposium on Liquid Metal Magnetohydrodynamics, 16–20 May 1988, Riga, USSR

Scientific Committee
R. Moreau (France), Co-Chairman
J. Lielpēteris (USSR), Co-Chairman
S. Asai (Japan)
F.R. Block (FRG)
V.A. Glukhikh (USSR)
A. Ju. Ishlinskij (USSR)
P.S. Lykoudis (USA)
P. Minchev (Bulgaria)
H.K. Moffatt (UK)

Eighty participants from 13 countries attended the Symposium. 7 review lectures (45 min, including discussion), 32 oral reports (20 min, including discussion) and two posters sessions containing 32 poster (1 hr for acquaintance and 1 hr for discussion) were presented. The Symposium Programme also included visits to the Institute of Physics of the Latvian SSR Academy of Sciences who was hosting the Symposium.

The scope of the Symposium was defined within the guidelines of the title and the most important problems of liquid metal magnetohydrodynamics were outlined: turbulence and stability in a magnetic field; magnetohydrodynamic phenomena at strong interaction including those applicable to magnetohydrodynamic problems of controlled nuclear fusion; electrovortex flows (including magnetohydrodynamic problems of aluminium electrolysis); liquid metal stirring and shaping and other metallurgical aspects; energy conversion (MHD pumps and generators), MHD dynamo; measurements techniques; two-phase flows; growth of single crystals in a magnetic field, etc.

It was the opinion of the Scientific Committee and the participants that the Symposium reflected the present state of liquid metal MHD studies. Both the review lectures and scientific discussions which were centred on the nature and evaluation of the most vital developments of MHD contributed greatly to the success of the Symposium.

One prominent feature of the Symposium was also that it was attended by specialists from various countries (Western, socialist and developing) working in the field of liquid metal MHD. This meeting was characterised by free and fruitful scientific discussion, exchange of views and establishing of contacts. The participants put forward an idea that such meetings should be continued in the future. When discussing the venue of next IUTAM Symposium, Japan, Poland, France and other countries were named as candidates although unanimous decision had not been reached. There was a suggestion to ask the IUTAM to proceed with the organisation of the subsequent MHD meetings.

Countries represented and number of participants

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Publication of Proceedings

An agreement with Kluwer Academic Publishers B V on the publication of the Symposium Proceedings in 1988 has been made. This has been signed by the two co-chairmen of the Symposium, Professor R. Moreau and Dr. J. Lielpēteris. It is planned that the volume of the Proceedings will be about 500 pages.

Financial support

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM).
**SCIENTIFIC PROGRAMME**

**Session A: Large Interaction Parameter**

O. Lielausis: Flows at Large Interaction Parameter
I. V. Lavrent'ev: MHD Flows at Large Rm, N, and Ha
K. Miyazaki, S. Inoue, N. Yamaoka: MHD Pressure Drop of Liquid Metal Flow in Circular and Rectangular Ducts under Transverse Magnetic Field

**Poster Session 1:** DC Fields

G. Gerbeth, D. Hamann: Dispersion of Small Particles in MHD Flows
A. El-Boher, S. Lesin, H. Branover: Liquid Metal Two-phase Flow in MHD Systems
J. P. Thibault, A. Alemany: MHD Two-phase Flow in Pipe
A. Bojarevics, Ju. M. Gel'gat, L. A. Gorbunov: Melt Magnetohydrodynamics of Single Crystal Growth
Ju. M. Gel'gat, V. P. Polishhuk, L. P. Puzhajlo, M. Z. Sorkin: Kinetic Characteristics of Gas Bubble Motion in Liquid Metal under Vacuum Processing in the MHD Sets
A. A. Klijkin, Ju. B. Kolesnikov: MHD Turbulence Decay behind Spatial Grids

**Session B:** Fusion Related Flows

M. Tillack: Application of the Core Flow Approach to MHD Fluid Flow in Geometric Elements of a Fusion Reactor Blanket

**Session C:** Current Carrying Melts

Eh. V. Shcherbinin: Electrically Induced Vortical Flows

**Session D:** Aluminium Reduction Cells

R. Moreau, S. Pigny, S. A. Maslowe: Amplitude Evolution of Interfacial Waves in Aluminium Reduction Cells
V. Bojarevics, E. V. Gorbachev, A. I. Chajkovskij, Eh. V. Shcherbinin: Physical and Mathematical Modeling of MHD Effects in Aluminium Reduction Cells
J. Desclouy, M. V. Romero: On the Analysis through Perturbation Methods of the Anodic Current Fluctuations in an Electrolyte Cell for Aluminium Production
J. Lielpeteris: MHD in Riga

**Session E:** AC Stirring

Y. Fautrelle: Liquid Metal Flow Induced by AC Fields
J. Mikelsone, L. L. Buluygin, A. Jakovicas: Induction Furnace Liquid Metal Flow Study Based on Numerical Simulation
B. Caillault, R. Perrier, J.-J. Aubert, Y. Fautrelle: High Frequency Induction Furnace for Oxides Melting
R. Fricke, A. Mühlbaumer, A. Walther: Directional Melt-Flow in Channel Induction Furnaces
Session F: Electromagnetic Shaping

S. Oshima, R. Yamane: The Shape of Liquid Metal Jets under a Uniform Transverse Magnetic Field
M. Garnier, J. Etay, A. Gagnoud, F. Garnier: Electromagnetic Control of Liquid Metal Free Surfaces
G. Gerbeth, A. Gallitis, M. Kaudze: Deformation of an Electrically Conducting Drop in a Magnetic Field

Poster Session 2: AC Fields

G.J. Bendszak, P.P. Biringer: Electromagnetically Induced Bath Stirring in DC Arc Furnaces
A.J. Mestel: More Accurate Skin-Depth Approximations
F.R. Block, P. Palm: Overall and Local Skin Thickness Measurement of Bars M.N.B. Saad, A.D. Sneyd: Flows Induced in a Plane Channel by a Travelling Periodic Magnetic Field
R. Krišbergs, O. Lielausis, L. Ulmanis, M. Pūkis, R. Valdmans: Determination of the MHD Machine Parameters Using the One-component Flow Model
F. Werkoff, Y. Xu: Theoretical Studies on the Instabilities of Induction Pumps and Generators at Large Rm Numbers
V.A. Glukhikh, B.G. Karasev, I.R. Kirillov, A.P. Ogorodnikov: 3500 m³/h MHD Pump for Fast Breeder Reactor
Ph. Marty, A. Alemany, F. Werkoff: Self-Excitation of LMMHD Generators
R. Kenny: Liquid Metal Flows Near Magnetic Neutral Points
Ch. Vives: Grain Refinement in Continuously Cast Ingots of Light Metals by Electromagnetic Stirring
D.C. Lillicrap: Liquid Metal Flow Control Using AC Fields

Session G: Measurements

I.E. Tarapov, I.I. Ievlev, V.I., Legejda: The Kinematic Aspect of MHD Flows at Large Rm
L. Lahjomri, Ph. Capelan, A. Alemany, S. Cristoloveanu: On Local Measurements of the Up- and Downstream Magnetic Wake of a Cylinder at Low Rm
S. Asai: Metallurgical Aspects in Material Electromagnetoprocessing

Session H: Dynamo Theory

H.K. Moffat: Liquid Metal MHD and the Geodynamo
A. Gaitlis, B.G. Karasev, I.R. Kirillov, O. Lielausis, A.P. Ogorodnikov: Helical MHD Dynamo
A.D. Gilbert: The Ponomarenko Dynamo

Session I: Turbulence

I. Platnieks, S.F. Seljuto: The Effect of Initial and Boundary Conditions upon the Formation and Development of MHD Turbulence Structure
J. Sommeria, J.M. Nguyen Due, Ph. Caperan: Two-dimensional MHD Turbulence

Session J: Stability with Uniform Field

P. Tabeling: Chaos in Electrically Driven Periodic Flows

J. Lielpēters

IUTAM Symposium Transsonicum III, 24–27 May 1988, Göttingen, FRG

Scientific Committee

J. Zierep (FRG), Chairman
S. Berndt (Sweden)
J. Délery (France)
I. Imai (Japan)
R.C. Lock (UK)
O.S. Ryzhov (USSR)
R. Seebass (USA)

Honorary Chairman:
K. Oswatitsch (FRG-Austria)
K.G. Guderley (USA)

Short summary of scientific progress achieved

The long tradition of the preceding Symposia Transsonica, 1962 at Aachen and 1975 at Göttingen, was continued. These two had been mainly formed by the personality of Professor Oswatitsch. Going through the Springer Proceedings of the past two meetings and comparing the contents with the present program we see the following trend. In 1962 the analytical methods (hodograph-, para-
bolic, characteristic, integral equation method) dominate. Already in 1975 the center of interest shifted markedly to Computational Fluid Dynamics (CFD). These methods are now the dominating ones. Two full sections are dedicated to CFD. To avoid large discussions about accuracy and reliability right at the beginning a workshop had been organized before this meeting (September 1987). A well defined boundary value problem, the flow over a wing in a wind tunnel, was set up. All groups and institutions we know, that developed suitable computer programs, had been invited to participate in solving this flow problem numerically. All theoretical results were collected and compared with each other and with experiments done in Göttingen. This was an important start to test all available numerical methods and this should be continued in future. As main topics besides this the following sections had been selected: Asymptotics and Theory, Stability and Transition, Vortical Flows, Turbulent Shock Boundary Layer Interaction and Unsteady Flow. Altogether 7 survey lectures (45 Min) and 36 invited contributions (30 min).

**Countries represented and number of participants**

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**Publication of Proceedings**

The proceedings are due to appear during the first half of 1989 and will be published by Springer-Verlag, Berlin (editors: J. Zierep and H. Oertel).

**Financial support**

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM). Besides this the Symposium was sponsored by: British Aerospace, CONVEX, CRAY, DAAD, Daimler Benz AG, Deutsche Lufthansa AG, DFG, Dornier, Kreissparkasse Göttingen, MBB, MTU, Rheinmetall GmbH, Stifterverband für die Deutsche Wissenschaft.

**Session 1: CFD-Applications**

- P.E. Rubbert: Use of CFD and Experimental Results in Transonic Aircraft Design
- N. Hirose, S. Takanashi: Computational Transonic Aerodynamics Research in Japan
- J.C. Le Balleur, M. Lazareff: Three-Dimensional Viscous-Inviscid Computations for Transonic Wings
- D. Hänel: The Computation of Transonic Viscous Flows

**Session 2: CFD-Applications**

- M. G. Hall, M. F. Paisley: Improvements in the Formulation and Numerical Solution of the Euler Problem for Swept Wings
- W.M. Neilland: A New Fast Method for Solving Transonic Euler Equations
- P.H. Morice: Transonic Computations by Multidomain Techniques with Potential and Euler Solvers
- D. Schwamborn, P. Stykowskii, H. Oertel, Jr.: Numerical Simulation and Physical Modelling of Transonic Trailing Edge Flows
- G. Schnerr, U. Doehmann: Theoretical and Experimental Investigation of 2-D Diabatic Transonic and Supersonic Flow Fields

**Session 3: Asymptotics and Theory**

- J.D. Cole, L.P. Cook: Some Asymptotic Problems of Transonic Flow Theory
- J.P. Guiraud: Asymptotic Modelling and Transonic Aerodynamics
- V.N. Diesperov: Viscous Transonic Flow in the Vicinity of a Corner Point
- E.G. Shifrin: Uniqueness Theorem for the Direct Problem of a Laval Nozzle
Session 4: Stability and Transition
L.M. Mack: Stability of Three-Dimensional Boundary Layers on Swept Wings at Transonic Speed
D.M. Bushnell, M.R. Malik, W.D. Harvey: Stability and Transition
D. Arnal: Transition Prediction in Compressible Flows

Session 5: Vortical Flows
E. M. Murman: Transonic Vortical Flow
A. Elsenaar, K. A. Bütefisch: Experimental Study on Vortex and Shock Wave Development on the 65-Delta Wing
B. Wagner, S. M. Hitzel: Computations Relating to the Vortex Flow Experiment
A. Rizzi, G. Drougge, B. Müller: Navier Stokes and Euler Solutions for the Vortex Flow Delta Wing
A. Kumar, A. Das: Computation of Vortex Flow on a Delta Wing at Transonic Speed
K. Y. Narayan, S. N. Seshadri: Vortical Flows on the Lee-Surface of Delta Wings
M. Hafez: Numerical Simulation of Rotational Flows

Session 6: Turbulent Shock-Boundary-Layer Interaction
J. Delery: Turbulent Shock-Boundary-Layer-Interaction
A. Mignosi, J. B. Dor, A. Serandie: Wind Tunnel Studies of Natural Shock Wave Separation Unstabilities for Transonic Airfoil Tests

Session 7: Unsteady Flows
G. E. A. Meier: Unsteady Phenomena
V. Shankar, H. Ide: Unsteady Aeroelastic Computations for Flexible Configurations at Transonic and Supersonic Speeds
D. Basler, E. Stanewsky: Mechanism and Reynolds Number Dependence of Shock Induced Buffeting on Transonic Airfoils

N. Hirose, H. Miwa: Computational and Experimental Research on Buffet Phenomena of Transonic Airfoils
H. Hornung: Closing Remarks

6.
IUTAM/IFAC Symposium on Dynamics of Controlled Mechanical Systems, 30 May – 3 June 1988, Zürich, Switzerland

Scientific Committee
J. Ackermann (FRG)
P. Coiffet (France)
T. R. Kane (USA)
D. M. Klimov (USSR)
M. Mansour (Switzerland), Co-Chairman
W. Schiehlen (FRG)
G. Schweitzer (Switzerland), Co-Chairman
K. Yoshimoto (Japan)

Short summary of scientific progress achieved
Many mechanical systems are actively controlled in order to improve their dynamic performance. Typical examples, demonstrating the state of art and discussed at the Symposium are elastic satellites, active vehicle suspensions, robots, or magnetic bearings for rotors. The objective of the Symposium has been to present methods that contribute to the solution of problems like: modeling the mechanical system in such a way that the model is suitable for control design, designing multivariable controls to be robust, control for nonlinear motions, graphical tools, safety design.

The lectures were intensively discussed, and it is expected that the Symposium will have a stimulating effect on further research in this important and interdisciplinary field of mechanics and control. The next Symposium of this kind is expected to take place in Japan, this time under the main sponsorship of IFAC. Promising directions where future efforts will have to go appear to be: Improvements of the man-machine interface, extension of the role of software making the mechanical system more intelligent, capable of learning, safer and adaptable to the need of the human user.

Countries represented and number of participants
Brazil ........................................ 3  Japan ....................................... 10
China ....................................... 2  Netherlands .................................... 2
France ...................................... 2  Switzerland .................................. 20
Germany ................................... 14  USA .......................................... 7
Italy ........................................ 1  USSR .......................................... 3
Israel ....................................... 1  Total ......................................... 65
Publication of Proceedings

The proceedings are due to appear in the beginning of 1989 and will be published by Springer-Verlag, Berlin (editors: G. Schweitzer and M. Mansour).

Financial support

Financial support of the Symposium was generously provided by the International Union of Theoretical and Applied Mechanics (IUTAM) and by the ETH Zurich, by the European Research Office of the US Army (ERO) and by Sulzer Brothers Ltd. The Symposium was co-sponsored by the International Federation of Automatic Control (IFAC).

SCIENTIFIC PROGRAMME

Monday, May 30, 1988

**Modeling (Chairmen: Kilimov, D. M. and Wehrli, Ch.)**

Kane, T.R.: Computer Aided Formulation of Equations of Motion

Hiller, M.: Modeling the Dynamics of a Complete Vehicle with Nonlinear Wheel Suspension Kinematics and Elastic Hinges

**Modeling (Chairmen: Mansour, M. and Shubin, N. A.)**

Meirovitch, L.: State Equations of Motion for Flexible Bodies in Terms of Quasi-Coordinates

Ackermann, J., and P. Wirth: Model Verification and Experiments with Finite Effect Sequences (FES)

Tuesday, May 31, 1988

**Design Tools (Chairmen: Yoshimoto, K. and Müller, P.C.)**

Schleichlen, W.: Hardware - Software Interfaces for Dynamical Simulations

Diez, D., and G. Schweitzer: Simulation, Test and Diagnostics Integrated for a Safety Design of Magnetic Bearing Prototypes

**Graphical Tools (Chairmen: Khatib, O. and Glattfelder, A.H.)**

Maier, G. E.: Towards Graphical Programming in Control of Mechanical Systems

Putz, P.: Graphical Verification of Complex Multibody Motion in Space Applications

Examples for the Dynamics of Controlled Mechanical Systems (Chairmen: Hugel, J. and De Carli, A.)

Mizuno, T., and T. Higuchi: Structure of Magnetic Bearing Control System for Compensating Unbalance Force

Furuta, K., Yamakita, M.; Sugiyama, N., and K. Asaka: Fiber Connected Tug of War

Chiba, M., Tani, J., Liu, G., Takahashi, F., Kodama, S., and H. Doki: Active Vibration Control of a Cantilever Beam by a Piezoelectric Ceramic Actuator

Wednesday, June 1, 1988

**Sensors and Actuators (Chairmen: Schweitzer, G. and Zhao, H.)**


Hugel, J.: Fast Electrical Drives

**Aerospace (Chairmen: Skelton, R. and Brauchli, H.)**

Tsuechiya, K., Yamada, K.; and B. N. Agrawal: Attitude Stability of a Flexible Asymmetric Dual Spin Spacecraft

Sarychev, V. A., Belyaev, M. Yu., Sazonov, V. V., and T. N. Tyan: Orientation of Large Orbital Stations

Thursday, June 2, 1988

**Robotics (Chairmen: Cuny, B. and Hiller, M.)**

Kruise, L., van Amerongen, J., Löhnberg, P.; and M. J. L. Tierengo: Modeling and Control of a Flexible Robot Link

Gürgöze, M., and P. C. Müller: Modeling and Control of Elastic Robot Arm with Prismatic Joint

**Robotics (Chairmen: Ackermann, J., Khosla, P.K.)**

Fäßler, H. P.: Robot Control in Cartesian Space with Adaptive Nonlinear Dynamics Compensation

Wehrli, E., and T. Kokkinis: Dynamic Behavior of a Flexible Robotic Manipulator

**Robotics (Chairmen: Meirovich, L. and Weber, H.)**

Guzzella, L., and A. H. Glattfelder: A Decentralized and Robust Controller for Robots

Lu, D., Qian, Z.-Y., and Z.-J. Zhang: Decomposed Parameter Identification Approach of Robot Dynamics
Vehicles (Chairmen: Friedmann, P. and Thomson, B.)
Miura, H.: Researches of the Biped Robot in Japan
Laumond, J.P., Simeon, T.S., Chatila, R., and G. Giralt: Trajectory Planning and Motion Control of Mobile Robots

Friday, June 3, 1988

Aerospace (Chairmen: Furuta, K. and Kortüm, W.)
Friedmann, P.P., and M.D. Takahashi: A Simple Active Controller to Suppress Helicopter Air Resonance in Hover and Forward Flight
Komatsu, T., Uenohara, M., Iikura, S.; Miura, H., and I. Shimoyama: Active Vibration Control for Flexible Space Environment Use Manipulators

Vehicles (Chairmen: Schiehlen, W. and Sarychev, V.A.)
Kortüm, W., Schwartz, W., and I. Fayé: Dynamic Modeling of High Speed Ground Transportation Vehicles for Control Design and Performance Evaluation
Horiiuchi, E., Usui, S., Tani, K., and N. Shirai: Control of an Active Suspension System for a Wheeled Vehicle

Robotics (Chairmen: Kane, T. and Miura, H.)
Khosla, P.K.: Effect of Sampling Rates on the Performance of Model-Based Control Schemes
Khatib, O., and S. Agrawal: Isotropic and Uniform Inertial and Acceleration Characteristics: Issues in the Design of Redundant Manipulators  
G. Schweitzer

Other Meetings
The Bureau met in Grenoble, France, on 22 and 27 August 1988.

Meetings co-sponsored in 1988

1.
An International Conference on Tropical Micro-Meteorology and Air Pollution was held at I.I.T., Delhi from February 15 to February 19, 1988. About 200 delegates from 30 countries participated in the deliberations of the conference. The proceedings of the conference will be published as a special issue of the journal “Atmospheric Environment”. The conference was co-sponsored by IUTAM and many other organisations.

2.
The International Symposium on Modeling Soil-Water-Structure Interactions, SOWAS '88, was held at Delft University of Technology, The Netherlands from 29 August to 2 September 1988. The Symposium was organized under the auspices of the International Association for Hydraulic Research (IAHR), Section Experimental Methods in Hydraulics and Fluid Mechanics and co-sponsored by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), the International Union of Theoretical and Applied Mechanics (IUTAM) and some national organizations.
TREASURER'S REPORT

Balance December 31, 1987 ........................................... US $ 343,861

Excess of cash revenues collected over expenses paid for the year ............. 40,800

Balance December 31, 1988 ........................................... 383,920

Statements of cash revenues collected and expenses paid over the year.

Cash revenues collected:
- Subscriptions ..................................................... 58,478
- Interest income .................................................. 21,847
- Contribution from fee ICTAM .................................. 14,265
- Allocation ICSU .................................................. 11,748
- Repayment Symposia .......... ................................... 3,486

Total cash revenues collected ..................................... 109,824

Expenses paid:
- Symposia ......................................................... 32,605
- Allocation ICTAM .............................................. 4,982
- Meetings Electoral Comm ...................................... 4,610
- Meetings Congress Comm ...................................... 6,475
- Meetings Bureau ............................................... 3,544
- Travel costs, other ............................................ 2,763
- Contribution to ICSU ........................................... 1,395
- Administration, including audit-fee and IUTAM prizes .............. 4,505
- Printing costs .................................................. 5,343
- Bank charges ................................................... 439

Total expenses paid .................................................. 66,661

Excess of cash revenues collected over expenses paid for the year before gain (loss) from translation of other currencies into US dollars .................................................. 43,163

Gain (loss) from translation of currencies ................................ (2,363)

Excess of cash revenues collected over expenses paid for the year ............. 40,800

STATEMENTS of movements on IUTAM bank accounts

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Time Savings Deposits

| Champion Federal | 72,421.70 | 4,572.44 | 77,569.14 | $        |
| Nat. Bank of Urbana | 80,042.75 | 5,959.94 | 11,704.55 | 85,787.76 | $        |
| Investors Savings Bank | 43,927.86 | 3,144.29 | 47,072.15 | $        |
| Bank Mees & Hope  | 87,468.75 | 1,757.11 | 89,225.86 | HUF      |
Payment of Annual Dues
(as of 31 December 1988)

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Bank Accounts of IUTAM

Treasurer: Prof. L. van Wijngaarden, University Twente, Postbus 217, 7500 AE Enschede, The Netherlands.
Assistant Treasurer: Prof. Philip G. Hodge, Jr., 107 Akerman Hall, University of Minnesota, Minneapolis, MN 55455, USA
Marquette Bank University, 718 Washington Avenue S.E., Minneapolis, Minnesota 55414 (USA), acc. nr. 103-1178
Bank Mee & Hope NV, Oude Delft 165, 2611 HB Delft (The Netherlands), acc. nr. 259185 051
Deutsche Bank A.G., Filiale Darmstadt, D-6100 Darmstadt (FRG), acc. nr. 2363398

Representation in other organizations

ICSU
Prof. J. Hult represents IUTAM in the General Committee of the International Council of Scientific Unions.

CODATA
Prof. D. C. Drucker acts as Representative of IUTAM in the Committee on Data for Science and Technology.

COSPAR
Prof. W. Fiszdon 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
Prof. G. M. Lespinard 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 1988

Donations given to IUTAM Symposia are recorded under the heading “Financial support” of the Reports of Symposia held in 1988.
Summary Record of the General Assembly of IUTAM in Grenoble, France, on 24 and 25 August 1988

The General Assembly was held in the Amphithéâtre 2 and 1, ENS Ingénieurs-Electriciens, Domaine Universitaire, Saint-Martin-d’Hères. The meeting on 24 August started at 14.00 hours, the meeting on 25 August started at 17.30 hours.

The persons present

a) Representatives of adhering organizations:

b) Elected members:
G. Batchelor (UK), B. A. Boley (USA), N. J. Hoff (USA), W. T. Koiter (Netherlands), F. I. Nihardson (Denmark), L. I. Sedov (USSR).

c) Representatives of affiliated organizations:

d) Invited observers:
S. H. Crandall (USA), Saleh A. Al-Athel (Saudi Arabia), M. S. El Naschie (Saudi Arabia).

The persons presented by proxies

a) Adhering organizations:
China: L. Qian represented by T. C. Lin
Czechoslovakia: J. Nemec represented by J. Jira
FRG: E. Krause represented by K. Gersten
India: H. S. Mukunda represented by N. C. Nigam
Japan: I. Tani represented by I. Imai
Poland: W. Szczepinski represented by W. Gutkowski
Spain: M. Bautista Aranda represented by Perez del Natio
Sweden: J. Carlsson represented by S. Berndt
UK: T. B. Benjamin represented by H. K. Moffatt
A. A. Wells represented by W. G. Price
USSR: K. V. Frolov represented by I. F. Obraztsov

b) Elected members:
Y. H. Ku (USA) represented by Z. Zheng (China)
P. Y. Zhou (China) represented by Z. Zheng (China)

Agenda 24 August

1. Opening to the meeting by the President
2. Report by the Secretary-General
3. Report by the Treasurer on financial matters
4. Preliminary discussion on annual dues
5. Report on relations with ICSU
6. Report by the Secretary on the Congress Committee of IUTAM
7. Report on the Bureau prize experiment
8. Matters concerning Adhering Organizations
9. Matters concerning Affiliated Organizations
10. Matters concerning Inter-Union Committees and Commissions
11. Matters concerning Non-ISCU Organizations
12. Announcement by the Electoral Committee regarding the election of the Bureau of IUTAM
13. Preliminary discussion on the establishment of an International Summerschool on Mechanics
14. Preliminary discussion on future Symposia

Proceedings of the General Assembly

Item 1 – Opening of the meeting by the President
The President, Sir James Lighthill, opened the meeting and greeted all members and observers welcome. The President pointed out that IUTAM pursues many successful activities including some new ones.
Item 2 - Report by the Secretary-General
The Secretary-General, Professor W. Schiehlen, submitted the following report to the General Assembly on the activities of IUTAM since the last General Assembly in London, England on 30 August 1986.

Mr. President, Dear Colleagues,
Two years have passed since our last General Assembly in London, England. During that time I have had the sad duty of recording the death of four colleagues and friends who have served our Union in the past. May I ask you all to stand in honour of our deceased, while I read their names.
Dr. Francois Frenkiel of the United States of America died on 9 July 1986. He represented his country for 30 years in the General Assembly, since the early days in 1952, and up to his death he was an elected member of our General Assembly. Dr. Frenkiel represented IUTAM also in the Scientific Committee on Problems of the Environment for many years.
Professor Witold Nowacki of Poland died on 23 August 1986. He was a member of our General Assembly from 1954 to 1978, more than two decades. Professor Henry Görler of the Federal Republic of Germany died on 31 December 1987. He served our Union in all offices continuously: 1964 he was elected Secretary-General, 1968 Treasurer, 1972 President, and from 1976–1980 he has served as Vice-President. Henry Görler represented his country in the General Assembly from 1952–1981.
Professor Horst Leipholz of Canada died on 22 March 1988. He was a member of the General Assembly from 1973–1979.
Our sympathy and our grateful thoughts for their excellent work for our Union go to their families and to their nations.

1) National Adhering Organizations
An official application to join IUTAM as a National Adhering Organization has been received from the King Abdulaziz City for Science and Technology in Riyadh, Saudi-Arabia. It will be discussed today under Item 8.
An inquiry to join IUTAM was received from Professor Choung Mook Lee, Republic of Korea.
An application for change in membership status has been put forward by the Society of Theoretical and Applied Mechanics, Taipei, Republic of China. The Adhering Organization of the Federal Republic of Germany was renamed to Deutsches Komitee für Mechanik (DEKOMECH).
A new National Adhering Organization of Roumania has not been announced. We sincerely thank our colleagues and friends retired before 31 December 1987 from our General Assembly for their devoted work.
Prof. K.W. Neale of Canada, Prof. H. Hornung of FRG, Prof. W. Albring and K. Hennig of GDR, Prof. P.S. Theocaris of Greece, Prof. J. Villaggio of Italy, Prof. J. Blaauwendaal and G. Vossers of The Netherlands, Prof. P. Chadwick, H.K. Moffatt and F.T. Smith of UK, Prof. J.W. Dally and S.H. Davis of USA, Prof. Belotserkovsky of USSR, Prof. J. Jaric of Yugoslavia.

We welcome our colleagues appointed before 31 December 1987 and look forward to a long and fruitful cooperation for the benefit and progress of our Union.
Prof. S.B. Savage of Canada, Profs. Qian Lingxi, Wang Ren and Zheng Zhehmin of China, Prof. M.J. Mikkola of Finland, Prof. K. Gersten and R. Krause of FRG, Prof. H. Günther and J. Altenbach of GDR, Prof. A.N. Kounadis of Greece, Dr. H.S. Mukunda of India, Prof. C. Polizzotto of Italy, Dr. A.M.A. v.d. Heijden of The Netherlands, Prof. W. Gutkowski of Poland, Dr. A.A. Wells, Profs. J.T. Stuart and J.R. Willis of UK, Dr. H.N. Abramson and Prof. L.B. Freund of USA, Prof. K.V. Frolov of USSR, Prof. D. Ruoci of Yugoslavia and Prof. G.K. Batchelor of European Mechanics Committee.

II) Affiliated Organizations
The International Centre for Mechanical Sciences (CISM) has been asked for cooperation in the establishment of an International Summerschool on Mechanics. The matter will be discussed today under Item 13.
The International Committee of Rheology (ICR) will organize 1992 the 11th International Congress on Rheology.
The 7th International Conference on Fracture will take place 1989 in Houston, USA.
The International Association for Computational Mechanics (IACM) will organize a Second World Congress on Computational Mechanics 1990 in Stuttgart, FRG.
Additional information can be obtained from my printed annual Report 1987.

III) Meetings of the Bureau
First meeting. The Bureau met in Stuttgart, FRG, on 11 and 12 April 1987. A summary record of that meeting was mailed to all members of the General Assembly. At this meeting the Bureau discussed the experiment of a Bureau prize to be awarded in the closing ceremony of our Grenoble congress. The experiment will be discussed today under Item 7.
Furthermore, the Bureau decided to propose the following new members of the Symposia Panels for the period 1988 through 1992: Prof. K. Gersten (FRG) for Fluid Mechanics and Prof. J.D. Achenbach (USA) for Solid Mechanics.
The Bureau also decided to propose that the retiring Vice-President Professor D.C. Drucker (USA) be elected by the General Assembly as member for the period 1988 through 1992 considering his long and distinguished services to our Union.
Finally the Bureau decided to support the reelection of the present elected members of the General Assembly for the same period.
Second meeting. The Bureau met last Monday here in Grenoble. The meeting was mainly devoted to the preparation of our General Assembly now in session.
Third meeting. The Bureau will meet 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 appoint the date and venue of its next annual meeting to be held in 1989. This will be reported to all of you in the minutes of the Bureau meeting.

IV) Symposia held
In all, 12 IUTAM Symposia have been held in the period of this report. Full accounts of the five symposia held in 1986 and the seven symposia held in 1987 are given in my printed annual Reports for these years.
In 1988 the following six symposia have been successfully held so far:

- IUTAM Symposium on Structural Optimization (Melbourne, Australia).
- IUTAM Symposium on Recent Advances in Nonlinear Fracture Mechanics (Pasadena, USA).
- IUTAM Symposium on Elastic Wave Propagation (Galway, Ireland).
- IUTAM Symposium on Liquid Metal Magnetohydrodynamics (Riga, USSR).
- IUTAM Symposium Transsonicum III (Göttingen, FRG).
- IUTAM/IFAC Symposium on Dynamics of Controlled Mechanical Systems (Zürich, Switzerland).

One more symposium will be held this year: IAHR/ISSMFE/IUTAM Symposium on Modelling Soil/Water/Structure Interactions (Delft, The Netherlands), 29 August – 2 September 1988.
Further, IUTAM co-sponsored the International Conference on Tropical Micro-Meteorology and Air Pollution held in Delhi, India, 15 – 19 February 1988.

V) Symposia in preparation for 1989
- Second IUTAM Symposium on Structure of Turbulence and Drag Reduction (Zürich, Switzerland), 25 – 28 July 1989.
- IUTAM/IAHR Symposium on Ice-Structure Interaction (St. John's, Newfoundland, Canada), 14 – 17 August 1989.
- IUTAM Symposium on Atmospheric Aerosols (China). Place and date are still open.

Further details on these symposia are given in Circular N – S also distributed to all members of the General Assembly.
The chairman of the IUTAM Symposium on Inelastic Deformation of Composite Materials, Professor G. J. Dvorak, asked for postponement of the Symposium to 1990.
The chairman of the IUTAM Symposium on Multiaxial Effects on Fracture, Professor K. J. Miller (UK), resigned from the organization of the symposium. Future IUTAM Symposia will be discussed today and decided tomorrow under Item 14 and 15.

VI) Publications of IUTAM
In the period 1986/87 the Proceedings of 15 IUTAM Symposia have been published. All details as to editors and publishers are given in my printed annual Report 1987.
The annual Reports of IUTAM are available from the Secretariat of IUTAM. They have been distributed to all members of the General Assembly and to a large number of persons and organizations showing interest in the activities of our Union as well.
A library of all IUTAM publications has been established under the auspices of Delft Library, Delft, The Netherlands. Further, the International Centre for Mechanical Sciences (CISM) has agreed to take care of the IUTAM Archive.

Mr. President,
Before I close this report I would like to address my thanks to yourself and the colleagues in the Bureau for the excellent cooperation in working for our Union. In particular, I would like to mention the very effective and harmonious procedure of forming an opinion within the Bureau of IUTAM. I also received great assistance from many members of the General Assembly in dealing with the duties of the office of the Secretary-General whenever it appeared necessary for our Union.

Thus, it was real pleasure to work four years for all of you as Secretary-General!
The report by the Secretary-General was unanimously adopted.
The General Assembly agreed on the following.
The IUTAM Symposium on Inelastic Deformation of Composite Materials is postponed to 1990.
The IUTAM Symposium on Multiaxial Effects on Fracture is cancelled.
The IUTAM Symposium on Atmospheric Aerosols is cancelled. On recommendation by Professor G. K. Batchelor, a new proposal should consider the event of the 13th International Conference on Atmospheric Aerosols taking place 1992, maybe in China.
Item 3 - Report by the Treasurer

The Treasurer, Professor L. van Wijngaarden submitted the following report to the General Assembly.

Mr. President, Dear Colleagues,

It is my pleasure to inform you about our financial situation. Our main income is in US $, the dues paid by the adhering organizations. Our main expenses are formed by the allocation, now $ 6,500, to each IUTAM symposium and a lesser sum to symposia which IUTAM holds in cooperation with other scientific organisations. Our financial activities therefore occur primarily in US $.

During the past years we have seen a considerable drop of the $ as compared to many other currencies. For example, the $ was worth 3.10 DM at the beginning of 1985 and at the end of 1987 this had dropped by 46% to 1.67 DM. This means that in 1985, when the IUTAM allocation was 5000 $, a chairman organizing a IUTAM Symposium in Germany could convert this into 15500 DM. In 1987, the IUTAM allocation was increased with 1000 $ to 6000 $ but he could get only 10000 DM for this. Similar calculations can be given for other hard currencies. Take for example the Swedish crown SEK. In 1985 5000 $ were worth 47000 SEK. To get 47000 SEK at the end of 1987, one needed 7700 $.

With a view to this I propose to increase the allocation, which we decided to raise to 6500 $ starting 1988, again with 500 $ in 1990 to 7000 $.

Can we afford to do so? We should certainly ask that question now since we have many symposia each year. In 1989 there will be at least 8 and quite a few are proposed, as you know, for 1990 and 1991. Let us therefore look at our assets. They have increased from 262252 $ in 1985 to 343120 $ at the end of 1987. This is considerably more than a correction for inflation would have required. In that case, a constant sum since 1982 only corrected for inflation, we needed to have 223022 $. The gain is primarily due to interest obtained from our time savings deposits and further, in the last two years, from gain from translation of other currencies. You will see that during the last years we earned each year about 20000 $ interest from our time savings deposits. These are administered, for what concerns those with banks in the USA, by the Assistant-Treasurer Professor Hodge, whom I would like to thank for all his work in these matters.

Another matter to discuss here with you concerns the annual dues which the adhering organisation pay to IUTAM. In 1976 it was decided to adjust these every two years on the basis of the OECD overall inflation index. At the previous meeting in London 1986, it turned out that over the years, the predicted inflation was less than the actual one. This was reason not to increase the unit of annual dues for 1988 and increase it with 4% to 415 $ for 1989. Let us look how the situation has developed since we came together in London in 1986. In 1985 the overall inflation rate was 4.3% and, as said, this was used to determine the increase in the unit due from 400 US $ in 1988 to 415 $ in 1987. However, the average rate of inflation in 1986 and 1987 was only 3.3%. Had we, on from 1982, kept to the actual inflation rate, we would arrive at 415 $ in 1990. My proposal is, with a view to this, to have in 1990 a unit annual dues of 416 $ and in 1991 of 430 $. You might wonder whether I didn't propose to keep the unit due on $ 415 in 1989. The reason is that the difference of 1 $ enables me, when receiving payment, to distinguish between the two years. For countries, wishing to pay equal amounts in 1990 and 1991, the unit due is proposed to be 425 $.

Finally I would like to mention the International Council of Scientific Unions (ICSU). We pay ICSU but we get more in return. There is a regular allocation which becomes smaller each year. Then there is the possibility to apply for special grants. We did apply for a grant of 10000 $ in order to enable young scientists from developing countries to participate in the present ICTAM in Grenoble. We received half of what we asked but nevertheless this special grant of 5000 $ is highly appreciated, while together with the $ 5 levied from the fee of each participant, it makes that we can support more participants. Coming at the end of this Report and at the end of my term as Treasurer I would like to thank you for your cooperation in the past two years.

The report by 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 the final decision regarding annual dues would be made in the second session of the General Assembly; see Item 17 below.

Professor J. T. Stuart asked on behalf of The Royal Society for an advance budget. The Treasurer pointed out that the number of symposia and the amount of allocation is decided by the General Assembly one to two years in advance.

Item 5 - Report on relations with ICSU

The representative of IUTAM on the General Committee of ICSU, Professor J. Hult, reported that the 1987 meeting of the General Committee took place in Rome, Italy, 29 – 30 October 1987. For further details he referred to his statements in the IUTAM annual report for 1987. The President, Sir James Lighthill, pointed out that IUTAM is not interested in collecting global data according to the International Geosphere-Biosphere Programme (IGBP). The International Space Year (ISY) should be supported by IUTAM. A proposal for a IUTAM symposium on space mechanics is very welcome for 1992. The Third World Academy of Sciences (TWAS) may be supported in the field of mechanics by the International Centre for Mechanical Sciences (CISM), an affiliated organization of IUTAM. The next General Assembly of ICSU will take place in Beijing, China, 11 – 16 September 1988.

Item 6 - Report by the Secretary of the Congress Committee

The Secretary of the Congress Committee, Professor H.K. Moffitt, submitted the following report.
Mr. President, Dear Colleagues,

1. We are already half way through the XVIth International Congress of Theoretical and Applied Mechanics, and you will all be well aware of the excellent scientific program that has been prepared under the guidance and control of the Congress Committee. The main elements of the program are the same as for the previous Congress held at Lyngby in 1984, namely Opening and Closing General Lectures, 15 Sectional Lectures, three Minisymposia on special topics, and about 570 contributed papers, of which 250 are contained in parallel lecture sessions, and 320 in poster sessions each of which includes a structured discussion stimulated by two chairmen. There is one significant change in program structure as compared with the Lyngby Congress — this is that the Sectional Lectures have been arranged in linear manner throughout the week, so that it is possible for any participant, if he so wishes, to attend every Sectional Lecture. In view of the great care and effort that is made in selecting Sectional Lecturers, we believe this to be a desirable change.

We believe that the present program structure is nearly optimal; but as always, the Congress Committee will welcome any feedback, whether positive or negative, from members of the General Assembly, that will enable it to make even more optimal arrangements for the next Congress.

2. On behalf of the Congress Committee, I would like to thank the International Papers Committee (IPC) — Professors Aref, Moreau, Mroz and Olhoff, for their work in selecting the 570 papers from more than 1300 papers submitted from some 50 countries. This was really an enormous task in April this year, involving very concentrated work over a period of 4 days (and nights!) here in Grenoble. The IPC was greatly assisted in this work by the preselection procedures of nine major countries of the Union, namely Canada, China, FRG, France, Japan, Poland, UK, USA and USSR, and I would like to thank the National Adhering Organisations of these countries for their invaluable help in this respect.

3. At its meeting on Sunday, the Congress Committee considered recommendations concerning its own membership that it would like to make to the General Assembly which will elect new members tomorrow, under Item 19 of the Agenda. Members are elected for a four-year period, and we consider that, consistent with the new rules that apply to the Bureau of IUTAM, eight years should normally be regarded as maximal, unless membership of the Executive Committee makes continued membership of the Congress Committee essential.

The present members of the Congress Committee and their limits of tenure are listed on page 12 of the 1987 IUTAM Report. The following members will complete a first term of 4 years service at the close of this Congress, and we recommend their reelection for a further 4-year term, in alphabetical order: Professors Bevilacqua, Chernyi, Collins, Drucker, Hult, Imai, Ishlinsky, Müller, Niordson, van Wijngaarden. Five members of the Committee come to the end of their terms, and I would like to thank them for their distinguished ser-

tice; these are Professors Brilla, Fiszdon, Lingxi Qian, Rimrott and Singer. I would like to express a special word of thanks to Professor Władek Fiszdon, who has served for many years on the Executive Committee with great distinction, but who has been prevented by ill-health from attending this present Congress. We wish to recommend the following new members to replace those who are retiring: Professors Hashin (Israel), Mroz (Poland), Olhoff (Denmark), Tabarrok (Canada), Zheng Zhemin (P.R. China).

We wish to recommend also that Sir James Lighthill, who has been President of the Congress Committee by virtue of his Presidency of the Union, should also be elected a member for the next 4 years. Finally, my own position as Secretary of the Congress Committee formally terminates at the end of this Congress. The Committee has indicated that it wishes me to continue, and I should be willing to do so, if the General Assembly is prepared to elect me also for a further term.

4. Finally, may I say something about the choice of location for the next Congress in 1992. The Congress Committee has already narrowed down the field of very strong proposals to two that seem particularly strong and attractive in different ways. These are proposals from Beijing, China and from Haifa, Israel.

The Congress Committee will have to make this important and difficult choice on Friday of this week, and I am sure that members of the Congress Committee will welcome any views that members of the General Assembly may wish to put to them before then, to help them to make the right decision. We are extremely fortunate to have two such strong proposals, and I am glad to report that there are four further proposals from Rio de Janeiro, Vienna, Hamburg and Warsaw, which are already in preparation for subsequent Congresses, so that the future of ICTAM is assured well into the next millennium.

The report by the Secretary of the Congress Committee was unanimously adopted.

The General Assembly agreed on the following.

The International Papers Committee (IPC) follows in a whole the recommendations by national preselection committees, however, the preselection is not binding in any individual case.

The final programme of the congress can hardly be sent out in advance even if it is highly desirable.

The best time for the congress is still the end of August.

Item 7 — Report on the Bureau prize experiment

The President of IUTAM, Sir James Lighthill, reported on the experiment of IUTAM Bureau prizes to be awarded during the 17th ICTAM in Grenoble, France. The prizes will be given to younger participants presenting good scientific work in an outstanding manner. Each of the two prizes will be awarded for a contribution in fluid mechanics and solid mechanics, respectively.
In the discussion several members of the General Assembly recommended improvements in the selection process. The participants should be asked in advance if they could be considered in the selection for a IUTAM prize with respect to their age.

Item 8 - Matters concerning Adhering Organizations
(1) Saudi Arabia. The King Abdulaziz City for Science and Technology (KAST) has applied for the membership with IUTAM as an Adhering Organization. KAST subscribed to IUTAM’s Statutes including Article IV which outlines IUTAM’s policy on nondiscrimination. The application was unanimously approved.

(2) Republic of Korea. An inquiry for membership had been received from the Republic of Korea. The Bureau is favour of this inquiry, however, first of all a national adhering organization has to be formed. The General Assembly agreed to postpone the decision.

(3) China, Taipei. The Society of Theoretical and Applied Mechanics, Taipei, has asked for a change in membership status from category I to category II. First, the General Assembly discussed the requirement of additional information on the increased activities in mechanics in the Republic of China. Then, the membership status of category II was unanimously approved.

Item 9 - Matters concerning Affiliated Organizations
Most of the Affiliated Organizations are submitting regular reports to be printed in the annual report of IUTAM. The General Assembly pointed out that regular reports are needed from all Affiliated Organizations.

Item 10 - Matters concerning Inter-Union Committees and Commissions
(1) The Committee on Space Research (COSPAR) is coordinating the activities of the International Space Year (ISY) scheduled for 1992.

(2) The International Commission on Acoustics (ICA) of the International Union of Pure and Applied Physics (IUPAP) has cosponsored the IUTAM Symposium on Elastic Wave Propagation.

(3) The 14th Congress of the International Commission in Acoustics will take place 1992 in Beijing (China).

Item 11 - Matters concerning Non-ICSU Organizations
Academician A. Yu. Ishlinsky submitted on the behalf of the World Federation of Engineering Organizations (WFEO) an invitation to appoint an observer of IUTAM. He reported that 95 countries are members of WFEO. The General Assembly adopted the invitation and asked the Bureau to take care of this matter.

Item 12 - Announcement by the Electoral Committee regarding the election of the Bureau of IUTAM
The Chairman of the Electoral Committee, Sir James Lighthill, reported on the work of the Electoral Committee and presented a slate of members of the Bureau for the period 1988 - 1992 proposed by the Electoral Committee. The final election of the new Bureau would take place in the second session of the General Assembly under Item 21.

Item 13 - Preliminary discussion on the establishment of an International Summerschool on Mechanics
The President of IUTAM reported on the plans of an International Summerschool on Mechanics. The summerschool could be organized jointly with the International Centre for Mechanical Science (CISM) with special financial support by IUTAM. The topic of the summerschool should be related to outstanding IUTAM symposia or ICTAM minisymposia, respectively. Professor L. Bevilacqua proposed to organize not only summerschools in Europe but also in other parts of the world, e.g. in Brazil. It was agreed that the final decision on summerschools would be made in the second session of the General Assembly under Item 18.

Item 14 - Preliminary discussion on future IUTAM Symposia
A total of 33 proposals had been received from the members of the General Assembly, and these proposals had been scanned by the two Symposia Panels. All the proposals and the preliminary reports of the panels had been sent to the members of the General Assembly. During a joint meeting of the two panels in Grenoble on 21 August 1988 the proposals had been grouped into three categories according to the system used since 1978. The Chairmen of the Symposia Panels reported on the recommendations of the two panels. The chairman of the Fluid Mechanics Panel, Professor H. K. Moffatt, summarized the criteria used for the recommendations:
- Timeliness of proposal,
- Interdisciplinary field,
- Competence of scientific committee,
- Activity of country and proposer,
- Avoidance of overlap.

The following proposals were given an *alfa* rating, indicating that the Panels agreed that they were highly recommended:
- Breaking waves,
- Nonlinear hydrodynamic stability and transition,
- Mechanics of fluidized beds,
- Fluid mechanics of stirring and mixing,
- Constitutive relations of plasticity,
- Contact loading and local effects in thin-walled plated and shell structures,
The President, Sir James Lighthill, expressed the appreciation of the General Assembly for the good work done by the two Panels and their chairmen. It was agreed that the final decision on future IUTAM symposia would be made in the second meeting of the General Assembly under Item 15.

The meeting then adjourned.

The meeting reconvened on 25 August 1988.

**Agenda 25 August**

15. Continued discussion and final decision regarding future IUTAM Symposia
16. Election of members of Symposia Panels
17. Continued discussion and final decision regarding annual dues
18. Continued discussion on the establishment of an International Summer-school on Mechanics
19. Election of members of the Congress Committee of IUTAM
20. Election of members of the General Assembly of IUTAM
21. Election of officers and all members of the Bureau of IUTAM
22. Date and venue of the next General Assembly
23. Any other business

**Proceedings of the General Assembly**

**Item 15 - Continued discussion and final decision regarding future IUTAM Symposia**

The General Assembly decided to accept the 12 proposals rated *alpha* and to reject the 6 proposals rated as *gamma*, see Item 14 above. After further discussion of the remaining 15 proposals two votes were taken, firstly the *beta 1*, *beta 2*, *beta 3* proposals and secondly all the remaining *beta* proposals. The following 7 proposals were finally accepted:

- Aero-thermodynamics in combustors,
- Low-gravity fluid mechanics,
- Numerical simulation of the non–isothermal flow of viscoelastic liquids,
- Separated flows and jets,
- Stability, bifurcation and chaos in stochastic systems.

**Item 16 - Election of members of Symposia Panels**

As members of the Symposia Panels for the period 1988 through 1992 were elected:
Fluid Mechanics Panel
Prof. A. Acrivos (USA), Chairman
Prof. K. Gersten (FRG)
Prof. I. Imai (Japan)
Prof. H.K. Moffatt (UK)
Prof. R. Narasimha (India)

Solid Mechanics Panel
Prof. S.H. Crandall (USA), Chairman
Prof. J. Achenbach (USA)
Prof. G. Maier (Italy)
Prof. J. Salencon (France)
Prof. M. Zyczkowski (Poland)

Item 17 - Continued discussion and final decision regarding annual dues
Following the proposal made by the Treasurer, Professor L. von Wijngaarden, see Item 3 and 4, the General Assembly decided the following amounts for the units of dues:

or 425 US $ for 1990 and 1991 for those who prefer equal payments in both years.

Item 18 - Continued discussion on the establishment of an International Summerschool on Mechanics
The General Assembly decided to establish an International Summerschool on Mechanics. The Bureau was asked to take care of this matter.

Item 19 - Election of members of the Congress Committee of IUTAM
The General Assembly decided to elect the following persons as new members of the Congress Committee for the period 1988 through 1992:

Prof. Z. Hashin (Israel),
Sir James Lighthill (UK),
Prof. N. Olof (Denmark),
Prof. Zheng Zhemin (China),
Prof. S. Leibovich (USA),
Prof. Z. Mroz (Poland),
Prof. B. Tabarrok (Canada).

Item 20 - Election of members of the General Assembly of IUTAM
All elected members of the General Assembly were reelected. The General Assembly elected then the following persons for the period 1988 through 1992:

Professor D.C. Drucker (USA),
Professor J. Hult (Sweden),
Academician A.Yu. Ishlinsky (USSR).

Item 21 - Election of officers and all members of the Bureau of IUTAM
The General Assembly elected the following persons as officers and members of the Bureau for the period 1988 – 1992, becoming effective on 1 November 1988:

President: Professor P. Germain (France)
Vice-President: Sir James Lighthill (UK)
Secretary-General: Professor W. Schiehlen (FRG)
Treasurer: Professor L. von Wijngaarden (Netherlands)
Members:
Professor B.A. Bole (USA)
Professor G.G. Chernyi (USSR)
Professor I. Imai (Japan)
Professor F. Ziegler (Austria)

Item 22 - Date and venue of the next General Assembly
On invitation of Professor F. Ziegler the General Assembly decided to hold its next meeting in August 1990 in Vienna, Austria.

Item 23 - Any other business
There was no other business, and the President closed the meeting.

Werner Schiehlen, Secretary General

Report

on

The activities of the Congress Committee during 1988

The activities of the Congress Committee culminated in 1988 with the successful holding of the 17th International Congress of Theoretical and Applied Mechanics by invitation of the Comité National Français de Mécanique at the Institut de Mecanique de Grenoble from 21 to 27 August. The Congress attracted a total of 951 registered participants from 44 countries distributed as follows (numbers for the Lyngby (1984) meeting are indicated in brackets):
Two meetings of the Congress Committee (CC) were held in Grenoble during the Congress on 21 August (24 members present) and 26 August (26 members present). The Committee took the following actions:


2. The CC agreed to recommend that the following new members be appointed for the 4-year period 1988–1992: Professors Hashin (Israel), Mroz (Poland), Olhoff (Denmark), Tabarrok (Canada), Zheng Zheming (China). The CC also agreed to recommend that Sir James Lighthill be elected a member for the same 4-year period. The General Assembly elected all the above, and in addition elected Prof. S. Leibovich (USA).

3. The CC elected the following Executive Committee for 1988—1992: P. Germain (President), H. K. Moffatt (Secretary), A. Acrivos, S. Kaliszky, M.J. Lighthill, N. Olhoff.

4. The CC considered invitations from P.R. China and from Israel to hold the XVIIIth ICTAM in August 1992. After a long debate and by a narrow vote, it was agreed that the XVIIIth ICTAM should be held in Haifa Israel. [The dates for the XVIIIth ICTAM have now been confirmed as Saturday 22—Friday 28 August 1992.] Professor J. Singer will be Chairman of the Congress.

The next meeting of the Congress Committee was set for Vienna 1990 in conjunction with the General Assembly meeting which will be held then.

H.K. Moffatt

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The very strong participation from the host country (France) is particularly notable.

The scientific program of the Congress followed the same pattern as that adopted at Lyngby in 1984, namely Opening and Closing Lectures at plenary sessions, invited Sectional Lectures, Contributed Papers in up to seven parallel lectures sessions and in poster/discussion sessions, and three mini-symposia on the topics 1. Mechanics of large deformation and damage, 2. The dynamics of two-phase flow, 3. Mechanics of the earth’s crust. This pattern for the Congress has been found to be popular and to give maximum opportunity for participation.

The papers contributed to the Congress were evaluated by the International Papers Committee which met in Grenoble, 13–16 April 1988. A total of 1262 papers were submitted, of which 573 were selected for presentation, 241 as lectures, and 322 in the 21 poster sessions. The IPC also advised on the award of travel grants to younger participants, and drew up a preliminary list of recommendation for Session Chairmen, for later confirmation by the Congress Committee.

The 22nd General Assembly of ICSU took place in Beijing, China, during 12–16 September 1988. New President of ICSU is M.G.K. Menon, India, cosmic ray specialist and Science Advisor to the President of India. New Secretary General is J.W.M. la Rivière, the Netherlands, microbiologist and former President of SCOPE. Treasurer is K. Thurai, FRG (re-elected). New Vice President is W. Gordon (USA), radio astronomy expert and Foreign Secretary of the US National Academy of Sciences.
Because of the need to keep under review the ethical aspects of developments in science and in scientific research, the General Assembly decided to create a Standing Committee on the Ethical Problems of Science (CEPS). The Past President of ICSU, Sir John Kendrew, was elected Chairman. The aim of CEPS is to anticipate ethical problems possibly before they arise.

The relation between the Basic Allocation to the Unions and their accumulated reserves were discussed at length in relation to the Report on Finance given by the Treasurer. It was agreed that the matter would be discussed again at a forthcoming meeting of the Treasurers of the Unions and of ICSU.

The General Assembly strengthened its position against all forms of racial, religious, political or sex discrimination. The Standing Committee on the Free Circulation of Scientists (SCFCS) will appoint a correspondent within each ICSU organization to act as a liaison with the committee. In addition all future announcements of ICSU-sponsored meetings will specifically mention Statue 5 of the ICSU Constitution relating to nondiscrimination and also a resolution, passed in 1966, demanding that politics be excluded from ICSU-related meetings.

The General Assembly finally urged all members of the ICSU family to engage in the International Decade for Natural Disaster Reduction (IDNDR), timed for the 1990s, which had been initiated by the United Nations. An Ad Hoc Group on Scientific Aspects of Natural Disaster Reduction, created by the Executive board of ICSU, under the Chairmanship of V.I. Keilis-Borok, has subsequently held its first meeting in Rabat, Morocco, where a number of relevant research projects were outlined. IUTAM was represented at the Rabat meeting by professor Rene Moreau, France.

The next meeting of the ICSU General Assembly will be held in Bulgaria in 1990.

Jan Hult

Report
on
Committee on Data for Science and Technology

CODATA continues vigorously in its mission "to improve the quality, reliability, processing, management, and accessibility of data of importance to science and technology". The 12th International Conference will be held July 15–19, 1990 in Columbus, Ohio, USA with invited and contributed papers and posters on 6 listed topics: scientific data consolidation and processing; technology and management of computerized databases; computerized data and systems analysis; information systems in materials science technology and engineering; bioscience numerical information processing; geoscience numerical information processing.

Daniel C. Drucker

Report
on
International Commission on Acoustics

The 1988 meeting of the International Commission on Acoustics was held in Bordeaux on 3 and 4 June. Much of the meeting was devoted to planning the 13th International Congress of Acoustics, to be held in Belgrade, Yugoslavia from 24 to 31 August 1989. Details of all lectures for plenary sessions were agreed, and a synopsis of the remainder of the programme approved. There will be a satellite conference in Zagreb (Electroacoustics, 1 to 3 September) and another in Dubrovnik (Sea Acoustics, 4 to 6 September). Preliminary plans for the 14th Congress, which will be held in 1992 in Beijing, China, were also formulated and discussed.

J. Lighthill

Report
on
Committee of the Teaching of Science (CTS)

The activities of CTS, financed by grants from ICSU, the Unions and Unesco, are mainly aimed at helping solve educational problems in developing countries. Among projects presently (fall 1988) being considered may be mentioned (1) The Science and Mathematics Education of Future Elementary Schoolteachers, (2) A Workshop on Ethics and Social Responsibility, (3) an initiative related to the Global Change program, (4) a workshop in Zimbabwe to produce teaching materials for secondary schools, (5) Computers and Microprocessors in Science Education, (6) ICSU-UNESCO Initiative in University Science Teaching. Professor D. J. Waddington, University of York, UK is the secretary of CTS.

S. B. Berndt

Report
on
International Centre for Mechanical Sciences (CISM)

I. Courses and Seminars

The regular programme of courses and seminars planned by the Scientific Council for 1988, took place in the two Scientific Sessions, the "Prager Session" (June-July, 1988) and the "Helmholtz Session" (September-October, 1988). The topics, always at an advanced level, included different fields of mechanics and related computer sciences, both at a basic and applied level. Some courses and seminars were sponsored by UNESCO and CNR (National Research Council of Italy).
The Prager Session (June—July, 1988);
- Advances in Teleoperations
- Structural Optimization under Stability and Vibration Constraints
- Postcritical Behaviour and Fracture of Dissipative Solids
- Mining Mechanics
- Internal Variables in Thermodynamics and Continuum Mechanics
- Machine Vision

The Helmholtz Session (September—October, 1988)
- Crack Dynamics in Metallic Materials
- Aero- and Hydroacoustics

2. Various International Events
Besides the courses various other activities were organized by CISM in 1988. The following ones were particularly noteworthy:

Communication in Manufacturing Automation (May 18—20, 1988)
The Workshop followed the previous one on “Mechanics and Informatics towards Automatic Manufacturing” held in 1987. It was intended for researchers and industry managers interested in the new problems emerging in today’s manufacturing process.

Control Theory and Structural Optimization (June 16—18, 1988)
Main topic: control theory, especially when applied to optimal design in mechanics and physics. Aim of the meeting was a reciprocal information on the most recent developments of research in these fields, which are of great interest both for engineers and mathematicians.

Seventh CISM-IFToMM Symposium on Theory and Practice of Robots and Manipulators (September 12—15, 1988)
This Symposium is jointly organized by CISM, IFToMM and the Polish Academy of Sciences and takes place every two-three years, once in Italy, once in Poland. A standing rule of the meeting is that the attendance is restricted to a limited number of invited papers and a certain number of experts able to contribute at informal discussions. The number of papers presented was 50, the total number of participants about 70.

The Fifth DANUBIA-ADRIA Symposium on Progress in Experimental Mechanics (October 13—15, 1988)
Purpose of this Symposium was to discuss the rapid advancement in experimental mechanics. It was organized for scientists, researchers, engineers, manufacturers and consultants interested in development and application of experimental techniques. The limited number of accepted papers which represented the modern trend of experimental mechanics in different countries guaranteed a good communication and personal exchange of information between the participants.

3. Editorial Activities
The lectures of several of the courses held at CISM are published in book form and distributed by Springer Verlag, Vienna-New York. The following books were printed in 1988:
G. DEL PIERO — F. MACERI: Unilateral Problems in Structural Analysis
C. CERCIGNANI: Kinetic Theory and Gas Dynamics
H. G. NATKE: Application of System Identification in Engineering
N. F. RIEGER: Rotordynamics
W. SZEMPLINSKA—STUPNICKA—G. IOSS — F. C. MOON: Chaotic Motions in Nonlinear Dynamical Systems
E. STEIN — W. L. WENDLAND: Finite and Boundary Element Techniques from Mathematical and Engineering Point of View
J. J. MOREAU — P. D. PANAGIOTOPoulos: Nonsmooth Mechanics and Applications
W. SCHIEHLEN—W. WEDIG: Analysis and Estimation of Mechanical Systems
R. R. CLEMENTS — P. LAUGINE—E. de TURCKHEIM: Selected Papers on the Teaching of Mathematics as a Service Subject
T. KAILATH: Lectures on Wiener and Kalman Filtering — 2nd reprint

The international journal for rapid publication “MECHANICS RESEARCH COMMUNICATIONS” (bimonthly), created by CISM and Pergamon Press, Oxford—New York in 1973, published in 1988 its fifteenth volume. It contains short communications on research related to a wide domain of both theoretical and applied mechanics. The journal, whose Editor-in-Chief is Professor Bruno A. Boley, plays an important role in implementing CISM’s aims and activities.

4. Scholarships
A limited number of scholarships, including free lodging and board, was offered during the courses to participants who were not supported by their home institutions, priority being given to young researchers coming from countries that contribute to CISM’s operating resources. Travel expenses as well as board and lodging of participants from developing countries have been covered by UNESCO contribution.

5. International Participation
In 1988, 40 lecturers from 12 countries delivered lectures in the Prager and Helmholtz Sessions. The two Sessions were attended by 222 participants com-
ing from 30 countries. Besides, the international meetings were attended by numerous participants from European and extra European countries.

G. Bianchi

Report on European Mechanics Committee (Euromech)

During 1988 the European Mechanics Committee organized the following Euromech Colloquia:

Euromech 232 19–22 April, Grenoble, France: Mechanical aspects of soil reinforcement
Euromech 233 29–31 August, Sophia-Antipolis (near Nice), France: Modelling of metal forming processes
Euromech 234 9–13 May, Toulouse, France: Turbulent two-phase flow systems
Euromech 235 30 May–2 June, Patras, Greece: Dynamics of large-scale vortical structures in turbulent shear flows
Euromech 236 12–15 September, Cambridge, England: Pattern selection and spatiotemporal chaos in fluids
Euromech 237 18–21 July, Marseille, France: Influence of density variations on the structure of low speed turbulence flows
Euromech 238 17–19 August, Uppsala, Sweden: Crack-tip modelling and fracture criteria
Euromech 239 15–17 August, Leicester, England: The mechanics of brittle creeping materials
Euromech 240 30 Aug.–2 Sept., Bologna, Italy: Dispersive waves in dissipative fluids
Euromech 241 27–30 September, Tallinn, USSR: Nonlinear waves in active media
Euromech 242 26–29 September, Wuppertal, Germany: Application of chaos concepts to mechanical systems
Euromech 243 26–29 September, Bristol, England: Energy from ocean waves
Euromech 244 4–8 July, Poznań, Poland: Experimental analysis of non-linear problems in solid mechanics.

H. H. Fernholz

Report on International Society for the Interaction of Mechanics and Mathematics (ISIMM)

The Society has now about 250 members from 28 countries. Its main activities are

a) To organize a “Symposium on Trends in Applications of Pure Mathematics to Mechanics” (STAMM) every second year;
b) to support irregularly held minisymposia on topics in line with the aims of the Society;
c) to become patron of scientific meetings if these correspond to the aims of the Society;
d) to edit scientific books written by members of the Society in the spirit of the Society.

STAMM 8 will be held under the chairmanship of W. Schneider, H. Troger and F. Ziegler in Hollabrunn near Vienna, Austria, August 13–18, 1989. The main topics are Numerical methods in nonlinear continuum mechanics, Dynamical systems and bifurcation, Asymptotic theory of viscous flow, Material science and thermodynamic aspects of continuum mechanics.

A workshop on “Partial Differential Equations and Continuum Models of Phase Transitions”, taken under the auspices of ISIMM, was organized by M. Rascle, D. Serre and M. Slemrod in Nice, France, January 11–15.

E. Kröner

Report on International Association for Computational Mechanics (IACM)

The main objective of IACM is to stimulate and promote research and practice in computational mechanics. Its membership is individual but national and regional organizations can be affiliated to IACM so individual members can alternatively join IACM via such organizations. During 1988 a number of such organizations have been created and affiliated to IACM. Thus, P.R. China, U.S.A., Argentina, Italy, Spain, and Scandinavia (Denmark, Finland, Iceland, Norway, Sweden) are affiliated.

The first World Congress on Computational Mechanics (WCCM) took place in Austin, Texas in 1986. The second is now under preparation. It will be held in Stuttgart, FRG, 27–31 August, 1990. The third will be held in 1994 in one of the countries of the Asia-Australia region.

A. Samuelsson
STATUTES
Statuts de l'Union Internationale
de Mécanique Théorique et Appliquée

ART. I
"L'Union Internationale de Mécanique Théorique et Appliquée" ci-après dénommée "l'Union" est une organisation scientifique à la fois internationale et non-gouvernementale.

ART. II
Les Principaux objectifs de l'Union sont
a) de constituer un lien entre personnes et organisations engagées dans le travail scientifique (théorique ou expérimental) concernant la mécanique ou les sciences associées;
b) d'organiser les congrès internationaux de mécanique théorique et appliquée par l'intermédiaire de son Comité permanent des Congrès (cf. Art. XII ci-après), et d'organiser d'autres réunions internationales sur des sujets relevant de la mécanique théorique et appliquée;
c) de s'engager en d'autres activités visant à promouvoir le développement de la mécanique, aussi bien théorique qu'appliquée, en tant que branche de la science.

ART. III
L'autorité suprême de l'Union est son Assemblée Générale.
Cette Assemblée détient le pouvoir de décider sur toute question affectant l'Union, notamment sur toute modification de ses Statuts. Sur des questions spécifiées, elle peut déléguer tout ou partie de ses pouvoirs à un ou à des organismes appropriés.

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 respectera le principe général de non-discrimination et reconnaîtra le droit pour tout homme de science dans le monde d'adhérer ou de s'associer à une activité scientifique internationale sans rencontrer d'opposition pour motif de race, de religion, de philosophie politique, d'origine ethnique, de citoyenneté, de langage ou de sexe.

ART. V
Dans les votes de l'Assemblée Générale, chaque membre ne dispose que d'une voix.

Pour une modification des Statuts, la majorité requise est de deux tiers des votes exprimés.
Pour toute autre décision la majorité simple des votes exprimés est requise.
Tout membre se trouvant dans l'impossibilité d'être présent à une réunion peut désigner, à l'avance et par lettre adressée au Secrétaire Général, un autre membre qu'il charge de voter en son nom.
Dans l'intervalle entre réunions de l'Assemblée Générale, un vote peut être émis par correspondance sur proposition formulée par le Bureau (cf. Art. XI ci-après). En pareil cas, le résultat du vote n'est valablement obtenu que si le nombre des participants effectifs n'est pas inférieur aux deux tiers du nombre total des membres de l'Assemblée Générale.

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

ART. VII
L'Assemblée Générale doit tendre 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 les unions de telles organisations) qui représentent effectivement une activité scientifique indépendante dans un pays ou dans un territoire bien défini peuvent être admises dans l'Union par l'Assemblée Générale comme "organisations adhérentes" pourvu que leur dénomination exclut tout malentendu quant à la qualification du pays ou du territoire en cause.
En principe, une seule organisation pourra être admise pour chaque pays ou chaque territoire.

ART. IX
Chaque "organisation adhérente" dispose d'un certain nombre de représentants dans l'Assemblée Générale et doit acquitter une cotisation annuelle à l'Union (cf. Art. XIV ci-après).

ART. X
Des organisations internationales dont les domaines principaux d'activité sont en étroite relation avec ceux de l'Union peuvent être admises par l'Assemblée Générale en qualité "d'organisations affiliées" à l'Union.
Chaque organisation affiliée a la faculté de désigner un observateur qui est invité à participer, sans droit de vote, à l'Assemblée Générale de l'Union. Le Bureau de l'Union (Article XI) a réciprocement la faculté de désigner un observateur, sans droit de vote, au Conseil Scientifique ou à l'organe 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 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 de quatre ans au plus. Le Bureau est composé d'un Comité Directeur (un Président, le précédent Président qui remplit la fonction de Vice-Président, un Secrétaire Général et un Trésorier) et de quatre autres membres de l'Assemblée Générale.
Les membres, qui ne sont pas au Comité Directeur, ne peuvent être reçus plus de deux mandats consécutifs. Les membres du Bureau nouvellement élus entrent en fonction au 1er novembre qui suit l'Assemblée Générale qui a procédé à leur élection.
Le Bureau doit se réunir au moins une fois par an. Tout membre du Bureau empêché de prendre part à une réunion de celui-ci peut désigner par lettre adressée au Secrétaire Général un autre membre de l'Assemblée Générale pour le remplacer à cette session.
Le Secrétaire Général centralise toutes les questions concernant le fonctionnement de l'Union y compris ses relations avec les organisations adhérentes affiliées ou autres.
Le domicile légal de l'Union se situe au domicile du Secrétaire Général. Le Bureau a le droit de désigner un trésorier-assistant en tout pays où l'Union est titulaire d'un compte bancaire. Les trésoriers-assistants peuvent être désignés en dehors des membres du Bureau mais parmi les membres de l'Assemblée Générale.
Le Bureau doit dresser un budget prévisionnel pour l'année à venir, administrer les finances de l'Union et soumettre à l'Assemblée Générale un rapport financier annuel.
Le Vice-Président remplit les fonctions du Président pendant toute période où celui-ci se trouve empêché de les exercer.
Entre les réunions de l'Assemblée Générale, il incombe au Bureau de désigner

un remplaçant temporaire pour remplir les fonctions du Vice-Président, du Secrétaire Général ou du Trésorier si cela s'avère nécessaire.

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

a) Le Président de l'Union préside aussi le Comité des Congrès.
b) Les Membres de ce Comité sont élus par l'Assemblée Générale, ce sont des hommes de science actifs dans le domaine de la mécanique théorique ou appliquée, n'appartenant pas nécessairement à l'Assemblée Générale.
c) Le Comité des Congrès élit ou réélit, pour une durée qu'il juge convenable, son Secrétaire Général.

ART. XIII
Les ressources financières de l'Union sont constituées par:
a) les cotisations annuelles des "organisations adhérentes";
b) les dons et subventions que l'Union peut recevoir.
L'Union doit tenir une liste de ses bienfaiteurs ou doivent être mentionnés pour chaque année les noms des personnes ou institutions qui ont fait bénéficier l'Union de donations, legs ou subventions.

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

<table>
<thead>
<tr>
<th>Catégorie</th>
<th>Nombre de représentants</th>
<th>Nombre d'unités de la cotisation annuelle</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
<td>3</td>
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<tr>
<td>III</td>
<td>3</td>
<td>5</td>
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<td>IV</td>
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</tbody>
</table>

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

1) Adoptés par l'Assemblée Générale de l'Union le 22 août 1984 à Lyngby (Danemark).
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 une seule 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 à des cas particuliers et exceptionnels. Dans ce but, elle fait part 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 de l'Union

1. Le Comité des Congrès se réunit au moins une fois lors de chaque Congrès.
2. Le Comité des Congrès peut instituer un Comité Exécutif chargé de prendre en son nom toutes les décisions nécessaires pendant la période qui s'écoule entre deux Congrès successifs, et de lui en faire rapport à sa prochaine réunion. Le Comité Exécutif comprend le président et le secrétaire du Comité des Congrès et un ou plusieurs membres désignés par le comité des membres.
3. L'organisation effectue d'un Congrès est confiée à un Comité local d'Organisation, élu par le pays ou l'organisation qui invite, et ce Comité est également responsable de la publication des Comptes rendus du Congrès. Le Comité d'Organisation fera son rapport au Comité des Congrès soit au cours du Congrès qu'il organise, soit avant, s'il le juge préférable.
4. Le Comité d'Organisation devra obtenir l'approbation du Comité des Congrès (normalement par l'intermédiaire du Comité Exécutif) pour toutes les questions relevant de la politique générale du Comité des Congrès, en particulier pour celles qui concernent:
   1. le but du Congrès;
   2. la sélection des communications pour le Congrès;
   3. le choix des conférences générales pour le Congrès;
   4. la désignation des présidents de sessions du Congrès;
   5. les principes généraux régissant les arrangements financiers du Congrès.
5. Le comité d'Organisation percevra, de tous les membres du Congrès, une contribution (dont le montant sera proposé par le Comité du Congrès et approuvé par le Bureau) afin de couvrir les dépenses administratives du Comité du Congrès. Ces contributions seront reversées à l'IUTAM immédiatement après le Congrès.

Statutes of International Union of Theoretical and Applied Mechanics

I

"The International Union of Theoretical and Applied Mechanics" hereinafter called "the Union" is an international non-governmental scientific organization.

II

The principal objectives of the Union are
a) to form a link between persons and organizations engaged in scientific work (theoretical or experimental) in mechanics or in related sciences;

b) to organize international congresses of theoretical and applied mechanics through a standing Congress Committee (Article XII), and to organize other international meetings for subjects falling within the field of theoretical and applied mechanics;

c) to engage in other activities meant to promote development of mechanics, both theoretical and applied, as a branch of science.

III

The highest authority of the Union is its General Assembly.
The General Assembly has the power to decide all questions affecting the Union, including alterations of the Statutes. On specified questions it may delegate its power to appropriate bodies.
The composition of the General Assembly is regulated in Article VI.
Meeting of the General Assembly will take place at times decided by the Bureau (Article XI) or on the request of at least 10 members of the General Assembly.

IV

In all its decisions the General Assembly shall be guided by the tradition of free international scientific cooperation, developed in the International Congresses for Theoretical and Applied Mechanics.
In pursuance of 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.

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.

1) Adopted by the General Assembly on August 22, 1984 in Lyngby (Denmark).
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>
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<td>I</td>
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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-organization, which is also responsible for publication of its Proceedings. The Organizing Committee will report to the Congress Committee either during or, if it sees fit, before the Congress which it organizes.
4. The Organizing Committee will obtain the approval of the Congress Committee (normally through the Executive Committee) with regard to all matters affecting the general policy of the Congress Committee, in particular with regard to:
   4.1 the scope of the Congress;
   4.2 the screening of papers of the Congress;
   4.3 the selection of general lectures for the Congress;
   4.4 the appointment of chairmen of sessions of the Congress;
   4.5 the broad principles regarding financial arrangements for the Congress.
5. The Organizing Committee will levy a fee (the level to be recommended by the Congress Committee and approved by the Bureau) for administrative expenses of the Congress Committee, from all Congress members. This fee will be paid over to IUTAM after the Congress.
Procedure for election of the Bureau of IUTAM

1. At the General Assembly, 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.

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List of Publications

a) Annual Reports, available at the Secretariat.
   The Union publishes since 1948 every year a Report with detailed information on all its activities.

b) Publications on Symposia, available from the publisher.
   49-1 Problems of Cosmical Aerodynamics; Proceedings of the Symposium on the Motion of Gaseous Masses of Cosmical Dimensions held at Paris, France, August 16-19, 1949, organized by IUTAM and IAU.
   Published by: Central Air Documents Office, Army-Navy-Air-Force, UB Building, Dayton 2, Ohio, USA.

   50-1 Colloque international de Mécanique, Pallanza, Lago Maggiore, Italia, 23-24 Juin 1950, organisé par l'IUTAM.

   50-2 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, n° 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).

   51-1 Colloque sur les Vibrations Non-Linéaires, tenu à l’île de Porquerolles, Var, France, 18-22 septembre 1951, organisé par l’IUTAM et l’URSI.

   52-1 Colloque Massau, tenu à Bruxelles, Belgique, les 25-29 avril 1952, organisé par le Comité Massau, avec le concours de l’IUTAM. Association des Ingénieurs de Gand, rue de la Victoire, Bruxelles.

   53-1 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, n° 2), Amsterdam”.
   Published by North-Holland Publishing Company, Amsterdam (Netherlands), 1953.

   54-1 Colloquium on Photoelasticity and Photoplasticity (Bruxelles, Belgium, 29-31 July 1954).
   Published by Imprimerie Dioncre, Chaussée de Boondael, 602-602a, Ixelles-Bruxelles (Belgique).

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

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

57-1 Third Symposium on Cosmical Gas Dynamics (Cambridge, Massachusetts, USA, 24-29 June 1957, in cooperation with IAU). Published by Reviews of Modern Physics, American Institute of Physics, 353 East 45th Street, New York 17, N.Y. (USA), 1958.


58-2 Symposium on Non-Homogeneity in Elasticity and Plasticity (Warsaw, Poland, 2-9 September 1958), organized by IUTAM. Published by Pergamon Press, Ltd., 4 & 5 Fitzroy Square, London W1 (UK), 1959.


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


62-4 Symposium Transsonicum (Aachen, Germany, 3-7 September 1962). Published by Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, West Berlin (Germany), 1964.

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


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


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

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

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

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

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

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

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

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


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

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

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


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

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


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

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


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


80-4 ICHMT/IUTAM Symposium on Heat and Mass Transfer and the Structure of Turbulence (Dubrovnik, Yugoslavia, 6-10 October 1980).


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


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

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

82-2 IUTAM/COSPAR Symposium on Giant Planets and their Satellites (Ottawa, Canada, 16 May – 2 June 1982).

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

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

82-5 IUTAM/IUMM Symposium on Modern Developments in Analytical Mechanics (Torino, Italy, 7-11 June 1982).

The Proceedings of the Symposium, edited by S. Benenti, M. Francaviglia and A. Lichnerowicz, have been published by the Academy of Sciences of Torino 1983.

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

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

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

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

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

82-11 IUTAM Symposium on Metallurgical Applications of Magnetohydrodynamics (Cambridge, England, 6-10 September 1982).

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

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


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


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

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, Zurich (Switzerland), 12-17 September 1926.

3rd Congress, Stockholm (Sweden), 24-29 August 1930.
AB. Sveriges Litografiska Tryckerier, Stockholm, 1931.


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


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.


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.


d) History of IUTAM

(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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