

# RHEOLOGY BULLETIN

Publication of The Society of Rheology, Inc.

Vol. 53, No. 2

August 1984



## 1984 SOR MEETING 56th ANNUAL MEETING

Virginia Polytechnic Institute  
and State University  
Blacksburg, Virginia  
February 24-27, 1985

### Program Committee

William B. Russel (chairman)  
Dept. of Chemical Engineering  
Princeton University  
Princeton, NJ 08544  
609/452-4590

Stuart J. Kurtz (co-chairman)  
Union Carbide Corporation  
Polyolefins Division  
1 River Road  
Bound Brook, NJ 08805  
201/365-8000, ext. 2471

### Local Arrangements Committee

Donald G. Baird (chairman)  
Department of Chemical Engineering  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061  
703/961-5998

Garth L. Wilkes (co-chairman)  
same address  
703/961-5498

## CALL FOR PAPERS

An abstract form is enclosed which should be used when submitting abstracts. Deadline for submission of abstracts is November 1, 1984. The deadline is a late one and must be heeded in order to prepare a program for the January 1985 Bulletin. Please send copies of abstracts to both the appropriate session chairman and the program chairman. No paper to be offered should have been presented elsewhere, nor should it be in press or published.

### Modeling Non-Newtonian Flows

D. S. Malkus  
Dept. of Engineering Mechanics  
University of Wisconsin  
1415 Johnson Drive  
Madison, WI 53706

### Molecular and Structural Theories

D. S. Pearson  
Exxon Research and Engineering  
Clinton Township  
Route 22 East  
Annandale, NJ 08801

### Dispersions/Granular Materials

J. W. Nunziato  
D. McTigue  
Sandia Labs, Dept. 1510  
P.O. Box 5800  
Albuquerque, NM 87185

### Foams and Solutions

A. M. Kraynik  
Sandia Labs, Div. 5813  
P.O. Box 5800  
Albuquerque, NM 87185

R. C. Armstrong  
Dept. of Chemical Engineering  
Massachusetts Institute of Tech  
Cambridge, MA 02139

### Liquid Crystals

K. F. Wissbrun  
Celanese Research Co.  
Summit, NJ 07901

### Applications to Polymer Processing

C. W. Macosko  
Dept. of Chemical Engineering  
University of Minnesota  
Minneapolis, MN 55455

### Optical Techniques

G. G. Fuller  
Dept. of Chemical Engineering  
Stanford University  
Stanford, CA 94305

T. Lodge  
Dept. of Chemistry  
University of Minnesota  
Minneapolis, MN 55455

### Ionomers and Blends

S. L. Cooper  
Dept. of Chemical Engineering  
University of Wisconsin  
1415 Johnson Dr.  
Madison, WI 53706

### Rheological Measurements

M. T. Shaw  
Institute of Materials Science  
University of Connecticut  
Storrs, CT 06268

### General

H. H. Winter  
Dept. of Chemical Engineering  
Goessmann Lab  
University of Massachusetts  
Amherst, MA 01003

### Beer/Poster Session: Interesting or Puzzling Rheological Problems in Industry

S. J. Kurtz  
Union Carbide  
P.O. Box 670  
Bound Brook, NJ 08805

### Plenary Lectures

R. C. Armstrong (MIT)  
(numerical simulations)  
R. Jackson (Princeton)  
(flow of granular materials)  
B. J. Ackerson (Oklahoma State)  
(structure in dispersions)

## SOCIETY OF RHEOLOGY TWO-DAY SHORT COURSE

February 23-24, 1985

There will be a short course on "Molecular Theory and Polymer Rheology" on Saturday and Sunday before the annual meeting. Lecturers are R. B. Bird (Chemical Engineering Dept.) and C. F. Curtiss (Theoretical Chem Inst.), University of Wisconsin-Madison.

The aim of this course is to show how molecular theories can shed light on rheological properties and constitutive equations for polymer solutions and polymer melts, as well as on the molecular stretching and orientation that takes place in various kinds of flow fields. Participants may send questions or suggestions in advance to R. B. Bird, Chemical Engineering Department, University of Wisconsin, Madison, WI 53706; questions and comments received before February 1 will be used in planning the details of the lectures, and, where possible these questions and comments will be addressed during the course.

## 1984 BINGHAM MEDALIST

Professor Bernard D. Coleman of the Carnegie-Mellon University has been named the 1984 Bingham Medalist of The Society of Rheology in recognition of his influential theoretical work in rheology. The award will be given at the Annual Meeting of the Society to be held in Blacksburg, Virginia on February 24-27, 1985.

Professor Coleman received a B.S. degree in Chemistry at the University of Indiana in 1951 and his Ph.D. in Physical Chemistry from Yale University in 1953. He then spent three years at the Carothers Research Laboratory of the duPont Company where he conducted basic studies on the tensile strength of fibers, the results of which are still widely quoted in the literature. In 1957, he joined the Mellon Institute as a Senior Fellow, and currently is Professor of Mathematics and Biology at the Carnegie-Mellon University.

The basic and varied contributions to rheology made by Professor Coleman and his collaborators include theoretical studies of viscometric flows of non-Newtonian fluids, linear and nonlinear viscoelasticity, thermodynamics of deforming materials, wave propagation in nonlinear visco-elastic materials, stability of various types of flows and deformations, and the birefringence of flowing and deforming materials. His work is noted for its mathematical rigor, yet he has obtained important results that have

## RHEOLOGY BULLETIN

Raymond R. Myers, Editor  
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been or could be checked against experimental data. Furthermore, the book "Viscometric Flows on Non-Newtonian Fluids," written in collaboration with H. Markowitz and W. Noll, has received wide recognition. Besides its noteworthy theoretical content, the book is an important reference on viscometry and the measurement of normal-stress differences.

Dr. Coleman has been a visiting professor at numerous universities in this country and abroad. He also has served on various university committees and is on the editorial board of journals on rational mechanics and mathematical biology.

### 1985 ANNUAL MEETING

October 14-16, 1985

The 57th Annual Meeting of The Society of Rheology will be held at the University of Michigan, Ann Arbor.

### 1985 BINGHAM AWARD NOMINATIONS

Nominations for the 1985 Bingham Medal are due in the hands of the chairman of the committee before February 15, 1985. Send nominations and supporting materials to Ward O. Winer, School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332.

### RULES TO GOVERN THE BINGHAM MEDAL AWARD

The E. C. Bingham Medal shall be awarded, usually annually, but in any event not oftener, at the Annual Meeting of The Society of Rheology. The medal may be awarded to any individual who has made outstanding contributions to the science of rheology provided that he, or she, has not previously received the award. It is not necessary that the recipient be a member of The Society of Rheology. There is no restriction as to the age of the recipient.

The Bingham Medalist shall be chosen in the following manner. A Bingham Award Committee shall be appointed by the president in conformity with the Rules of The Society. The committee will consist of seven members, each serving a three-year term and they will be appointed in a 2,2,3-person-per-year cycle. The Bingham Award Committee shall consider in any manner consistent with procedures established by the Executive Committee, all nominations submitted by any member of The Society. At a designated time, usually by April 1 prior to the Spring Executive Committee meeting, the chairman of The Bingham Award Committee shall convey its decision to the president and the secretary of The Society. The president in turn shall transmit the decision to the Executive Committee for ratification. The official announcement of the award shall be made by the secretary in advance of actual presentation, preferably in the Summer Bulletin.

### DISTINGUISHED SERVICE AWARD

The *ad hoc* Committee to Reconsider the Bingham Award Rules has recommended to the Executive Committee that The Society establish a *Distinguished Service Award*. The Executive Committee has considered the suggestion at its last two meetings and has decided that such an award should be established. The Award and procedures for selection of a recipient are as follows:

This is an award to recognize distinguished service to The Society of Rheology. The Award is to be independent of the Bingham Medal.

The Distinguished Service Award should not be an annual award, but should be given sparingly to those members whose service in responsible positions has extended over long periods and has been of great value to The Society.

The Executive Committee would appreciate any comments from the membership on the above procedure for identifying a recipient of the Award. Suggestions are also desired for the form of the Award. The *ad hoc* Committee recommended that the Award be a suitable inscribed hourglass, along with complimentary life membership in The Society. Please send your comments to W. R. Schowalter, Department of Chemical Engineering, Princeton University, Princeton, NJ 08544, prior to October 1, 1984.

## MINUTES EXECUTIVE COMMITTEE MEETING

April 14, 1984

The meeting began at 9:30 a.m. at the Cleveland Sheraton Hopkins Hotel. Members present were W. R. Schowalter, R. F. Landel, J.R. Collier, E. A. Collins, A. Eisenberg, and A. N. Gent. Excused, and not attending, were M. T. Shaw and R. R. Myers.

1. The minutes of the October 16, 1983 Executive Committee Meeting were approved and the Secretary's report was accepted.
2. The Treasurer reported that the uncorrected year end balance for 1983 was \$64,973.95 compared to \$47,259.67 a year earlier. However, a number of 1983 bills have not yet been received, e.g., billing from Wiley for the journal. The dues remain at \$20 per year for regular members and \$150 for sustaining members, both classes of members receive the journal which costs non-members \$120 from Wiley.
3. The Editor's report was read and accepted. The journal is in good shape, receiving 72 manuscripts in 1983, accepting 55, and rejecting 17. In addition to the membership, there are 3600 non-member subscribers to the journal.
4. President Schowalter reported that Kurt Wissbrun has agreed to continue as the Society representative to A.I.P. and that Bob Marvin has been contacted about updating the history of the Society. The Society is currently composed of 60 per cent engineers and 20 per cent chemists as contrasted to the other A.I.P. member societies that characteristically have a substantial majority of physicists in their memberships.
5. Short courses preceding the February 1985 (1984 annual meeting) and October 1985 meetings in Blacksburg, Virginia and Ann Arbor, Michigan were discussed, as were possible future short courses. The short courses will be on February 23 and 24 and October 12 and 13, 1985, respectively.
6. The rules for selection of the Bingham Medal were unanimously accepted after minor revisions.
7. The decision to move the 1984 annual meeting from Williamsburg to Blacksburg was made, primarily due to a significantly lower cost in Blacksburg and proximity to VPI.
8. A decision was made to seriously explore the possibility of reviving the practice of having a West Coast winter meeting starting in February 1986.
9. Kurt Wissbrun's report from A.I.P. included the facts that: the head tax increase from \$1 to \$2 on member societies will be effective in 1985 (*no* dues increase for SOR are contemplated); A.I.P. would like to solicit funds for a Physics Foundation but the presidents of member societies were not too supportive; and page charges in journals handled by A.I.P. were reduced by \$20 per page (the Journal of Rheology is handled by Wiley).
10. It was suggested during Old Business that the president solicit comments from members through the bulletin regarding the possible establishment of a Distinguished Service Award.

The meeting adjourned at 3:30 p.m.

John R. Collier,  
Secretary

### EDITOR'S REPORT

March 23, 1984

#### *Journal of Rheology*

We received 72 manuscripts in 1983, accepted 55 and rejected 17. There are 38 manuscripts presently in the review process. This performance compares favorably with 1982.

Volume 27 of the Journal of Rheology contained 657 pages, made up of 34 full articles, 4 notes, and abstracts from the Journal of the Society of Rheology, Japan, Volume 10, Nos. 2, 3, and 4.

We continue to solicit symposia by offering an issue of the Journal to symposia chairmen who gather six or more papers, refereed by rheologists. The December issue contained abstracts from the Symposium on Basic Measurements of Food Rheology, with a preface by D. D. Hamann and J. L. Kokini.

Forty-two papers are awaiting publication in Wiley's hands. This figure gives us about a six-month lead on publications.

#### *Rheology Bulletin*

Two bulletins issued last year. They now carry more information on overseas meetings, along with officers' reports and news of the meetings, award information, and nominee information.

Timing of the 1984 bulletin is affected by the I.C.R. Since we will not meet in October, the pressure to have a July bulletin is off, and one is expected in the fall, after the program is established for the February 1985 meeting.

We now have the bulk third class mailing privileges and the the last issue of the bulletin was mailed without any problems.

#### Acknowledgment

The Editor deeply appreciates the continued service and advice of the corps of editors: Robert C. Armstrong, Edward A. Collins, Shigeharu Onogi, J. George Savins, Charles L. Sieglaff, Alex Silberberg, and James L. White.

Raymond R. Myers,  
Editor

## FUTURE EVENTS

The IXth International Congress on Rheology will be held October 8-13, 1984 at the Acapulco Convention Center, Acapulco, Mexico. Contact for specific information is Prof. B. Mena, Instituto de Investigaciones en Materiales, Apdo. Post 70-360, Ciudad Universitaria, Coyoacan 04519, Mexico, D. F., Mexico.

A course on "Industrial Rheology: Principles and Practice" will be held at Massachusetts Institute of Technology August 6-10, 1984. Contact: ChoKyun Rha, Room 56-137, Biomaterials Science & Engineering Laboratory, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139.

An international symposium on "Composites: Materials and Engineering" will be held September 24-28, 1984 at The Center for Composite Materials, University of Delaware, Newark, Delaware 19716. Anthony Kelly, University of Surrey (U.K.) and A. B. Metzner, Department of Chemical Engineering, University of Delaware, are co-chairmen of organizing committee. Phone: (302) 451-8149.

The Mathematics Research Center at the University of Wisconsin-Madison will hold an Interdisciplinary Symposium on Viscoelasticity and Rheology on October 16-18, 1984. Contact: A. S. Lodge, Rheology Research Center, or Mrs. Gladys Moran, Conference Secretary, Mathematics Research Center, University of Wisconsin-Madison, 610 Walnut St., WARF Bldg., Madison, Wisconsin 53705.

The 55th Shock and Vibration Symposium will be held October 23-25, 1984 at the Air Force Aeronautical Systems Division/Wright Aeronautical Laboratories, Dayton, Ohio. Contact: The Shock and Vibration Information Center, Code 5804, Naval Research Laboratory, Washington, DC 20375. Phone: (202) 767-2220.

The 40th Annual General Meeting of the British Society of Rheology will be held on Wednesday, September 12, 1984, in the Physics Lecture Theatre, U.C.W., Aberystwyth.

A "Rheology of Lubrication & Other Industrial Processes" Conference will be held September 11-13, 1984 at the Physics Department, University College of Wales, Aberystwyth.

The 8th CHISA Congress with European Symposia on "Stress and Strain Behavior of Particulate Solids and on Mixing of Non-Newtonian Industrially Important Fluids" will be held September 3-7 in Prague, Czechoslovakia. Contact: 8th Congress CHISA '84, P.O. Box 857, 11121 Praha 1, Czechoslovakia.

An "International Rubber Conference" will be held in Moscow, U.S.S.R. on September 4-8, 1984. Contact: V. A. Berestnev, General Secretary, "Rubber 84" Organizing Committee, Krasnobogatyrskaya Street 42, Moscow 107258, USSR.

(Euromech 186) "Rheology of Biological Fluids" will be held September 12-14 in Nancy, France. Contact: M. Lucius, Institut National Polytechnique de Lorraine, B.P. 3308, Porte de la Craffe, 54014 Nancy Cedex, France.

The 10th International Conference on Nonlinear Oscillation will be held September 16-23 in Varna, Bulgaria. Contact: G. Brankov, Institute of Mechanics and Biomechanics, "Acad. G. Bonchev" Str. B18, 1113 Sofia, Bulgaria.

"Optical Methods in the Dynamics of Fluids and Solids (IUTAM)" will be held September 17-21, 1984 in Prague, Czechoslovakia. Contact: M. Pichal, Institute of Thermomechanics, Czechoslovak Academy of Sciences, Puskino n.9, CS 160 00 Praha 6, Czechoslovakia.

(Euromech 183) "Plasticity of crystalline media" will be held September 24-27, 1984 at Villetaneuse, France. Contact: A. Zaoui, Laboratoire P.M.T.M., C.N.R.S. Univ. Paris-Nord, Avenue J. B. Clement, 9340 Villetaneuse, France.

The Annual Meeting of the Spanish Rheology Group will be held in September in Granada, Spain. Contact: J. V. Aleman, Instituto de Plasticos y Caucho, Juan de la Cierva 3, Madrid 6, Spain.

(Euromech 191) "The physics of dispersion of small particles" will be held December 12-15, 1984 will be held in Cambridge, England. Contact: E. J. Hinch, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Silver Street, Cambridge, CB3 9EW, U.K.

The 19th annual national Colloquium of the French Group of Rheology on "Rheology of Anisotropic Materials" will take place in Paris on November 28-30, 1984. Contact: Stephane Richemond, 19e Colloque du Groupe Francais de Rheologie, CERMaC, ENPC, 28 rue des Saints-Peres, F-75007 Paris, France.

PAC Chem '84 will be held in Hawaii December 16-22, 1984. Contact (for macromolecular sciences program): L. A. Utracki, NRCC-IMRI, 750 Bel-Air, Montreal, Quebec, H4C 2K3, Canada.

(Euromech 184) "The inclusion of local effects in the analysis of structures" will be held September 11-14, 1984 at Cachan, France. Contact: P. Ladeveze, Laboratoire de Mecanique et Technologie E.N.S.E.T./Universite Paris VI/CNRS, 61, avenue du President Wilson, 94230 Cachan, France.

(Euromech 185) "Mathematical programming methods for the plastic analysis of structures" will be held September 17-21, 1984 in London, U.K. Contact: J. Munro, Civil Engineering Department, Imperial College, London, SW7, U.K.

The 6th Churchill Conference on Deformation, Yield and Fracture of High Polymers will be held April 1-4, 1985 in Cambridge, England. Contact: The Plastics and Rubber Institute, 11 Hobart Place, London SW1W OHL, U.K.

An "International Conference on Mechanical and Physical Behaviour of Materials under Dynamic Loading" will be held September 2-5, 1985 in Paris, France. Contact: DYMAT, Etablissement Technique Central de l'Armement, 16 bis, avenue Prieur de la Cote d'Or, 94114 Arcueil Cedex, France.

The annual meeting (DRG) will be held in Berlin, Germany in Spring, 1985. Contact: K. Kirschke, DRG e V, Unter den Eichen 87, D-1000 Berlin 45, BRD.

"Rheology in the Process Industries" conference will be held May 8 in London, England. Contact: H. A. Barnes, Unilever Research, Port Sunlight Laboratory, Bebington, Wirral, Merseyside L63 3JW, U.K.

IVth National Conference on Mechanics and Technology of Composite Materials will be held October 1-4, 1985 in Varna, Bulgaria. Contact: Ya Ivanov, Central Laboratory of Physico-Chemical Mechanics, Bulgarian Academy of Sciences, Acad. G. Bontchev, Str., IV km, BII, Sofia 1113, Bulgaria.

The Tenth U.S. National Congress of Applied Mechanics will be held at the University of Texas in Austin, June 16-20, 1986. Contact: E. B. Becker, Department of Aerospace Engineering and Engineering Mechanics, University of Texas, Austin, Texas 78712.

The 5th International Conference on Mechanics in Medicine and Biology will be held in Bologna, Italy, July 1-4, 1986. Contact: G. Pallotti, Faculty of Medicine and Surgery, University of Bologna, Dept. of Physics, Via Irnerio, 46-40126 Bologna, Italy.

Kyoto Symposium on Rheology '84 celebrating the retirement of Shigeharu Onogi will be held October 25, 1984 at the Kyoto International Conference Hall in Kyoto, Japan. Contact: Toshiro Masuda, Department of Polymer Chemistry, Kyoto University, Kyoto 606, Japan.

## ANNOUNCEMENTS

A Call for Papers has been issued for The Adhesion Society meeting to be held in Atlanta, Georgia on February 24-27, 1985. Inquiries should be sent to Meeting Chairman Douglas Rahrig, B.F. Goodrich R&D Center, 9921 Brecksville Rd., Brecksville, OH 44141, phone: (216) 447-5531. Abstract deadline is November 1, 1984.

A Call for Papers has been issued for the Fifth International Conference on Mathematical Modelling to be held July 29-31, 1985 at the University of California, Berkeley, California. Contact: Xavier J. R. Avula, Institute for Applied Sciences - Branch Office, P.O. Box 1488, Rolla, Missouri 65401. Abstract deadline is December 15, 1984.

Subscription to the monthly Shock and Vibration Digest is available for \$140 (domestic), \$175 (foreign) by ordering from The Shock and Vibration Information Center, Naval Research Laboratory, Code 5804, Washington, D.C. 20375.

We have been advised by the American Institute of Physics that a Directory of Physics and Astronomy Staff Members will be available to members of the Society of Rheology who desire a copy. The Directory will be ready for distribution in October. Members wishing to order a copy may do so by sending a request along with a remittance of \$10 to the American Institute of Physics, 335 East 45th Street, New York, New York 10017.

Wanted. A used Weissenberg Rheogoniometer (Model R-16 or R-17) is wanted either as a donation or for long term loan by an academic institution. Please contact Andy Rao at (315) 787-2266.

## SUSTAINING MEMBERS OF THE SOCIETY OF RHEOLOGY

Brookfield Engineering Labs., Inc.  
Brown University  
Cabot Corporation  
Celanese Research Co.  
E. I. Dupont de Nemours & Co.  
    Lavosier Library, Wilmington, Delaware  
E. I. Dupont de Nemours & Co.  
    Central R&D Dept., Wilmington, Delaware  
B. F. Goodrich Chemical Co.  
Hercules Inc.  
Howard University  
Kaltec Scientific Instruments Co.  
Kendall Co.  
University of Michigan  
Owens-Corning Fiberglass Corp.  
Chokyun Rha  
Rheometrics Inc.  
Sangama Schlumberger  
SDS Biotech Corp.  
Tennessee Eastman Co.  
Texas Tech University  
Union Carbide Corp., South Brook, NJ  
Union Carbide Corp., South Charleston, WV

## STATEMENT OF RECEIPTS & DISBURSEMENTS Year Ended December 31, 1983

Balance in account December 31, 1982*		\$47,259.67
<i>Receipts</i> January 1 - December 31, 1983		
Dues 1982, 1983, 1984 and Interest on Dues Collections	\$27,174.00	
Interest, Savings & Certificates	3,381.07	
Sales of Mailing Lists less Processing Costs	244.00	
Page Charges/Journal of Rheology	3,312.00	
Annual Meeting - Evanston 1982	187.24	
Annual Meeting - Knoxville 1983	3,240.00	
Short Course - Knoxville	3,325.00	
		<u>40,863.31</u>
Total Receipts		\$88,122.98
<i>Disbursements</i> January 1 - December 31, 1983		
Charges for Dues, Billing, Collection @ \$1.75	\$ 2,286.00	
Charge for Preparation & Maintenance Records @ \$2.15	2,608.00	
Financial Handling - 1983	280.00	
Member Dues 1983 @ \$1.00	1,200.00	
Journal of Rheology Printing Mailing Labels & Renewal Billings	1,206.00	
Journal of Rheology Vol. 26 #6 and Vol. 27 #1-6	1,186.93	
Mailing, Winter Bulletin, Officer Nomination, Fall Meeting, Ballot, International Congress notices	562.00	
Editorial Charges	2,700.00	
Printing new letterheads & brochure	600.00	
Administrative Services, AIP	2,100.00	
Evanston Meeting	1,046.26	
SOR Bulletin, Abstracts, Program	2,349.54	
Short Course - Evanston	416.15	
Short Course - Knoxville	2,088.24	
Miscellaneous-Postage, UPS, Envelopes, Discretionary Accounts, Liability Insurance	2,519.91	
Total Disbursements		<u>\$23,149.03</u>
Balance in Account December 31, 1983		<u>\$64,973.95</u>

\*Adjusted to include 1982 Final Receipts and Disbursement Variance

Edward A. Collins, Treasurer  
April 10, 1984