RHEOLOGY BULLETIN

Publication of the Society of Rheology

Volume 24, No. 1 Spring, 1955

LARGE OR SMALL?

A scientific society can grow in many ways and in many directions. It becomes thus more effective and successful, except for personal contacts and exchange of information and ideas. Particularly, at meetings which are meant to facilitate such exchange, difficulties of adequate communication arise. It is exactly with respect to this problem that our Society experiences growing pains.

Our last three annual meetings were characterized by a rapid expansion, so much so that the Executive Committee decided to solicit no more than 20 papers. This would enable the Program Committee to plan for 5 half-day sessions with four papers each and plenty of discussion, the most essential part of every meeting. Experience with our, and other, meetings has shown that more than four, or at the best five, papers per session put a heavy strain on the audience and cut attention and participation. Meetings longer than two and a half days, or extending into Saturdays, on the other hand, are rather unpopular.

However, notwithstanding these facts and the Committee's resolution, years of advancing the course of Rheology have recoiled and caused a veritable flood of papers for this year's Fall Meeting. Forty-two papers have been submitted by now, and more may come, confronting the Program and Executive Committees with a serious dilemma.

None of the possible solutions are happy ones. Refusing papers means extensive refereeing; having to return almost half of the entries, inevitably very desirable papers would have to be eliminated, contrary to the best efforts of our Society. Crowding the session to the extent of seven papers, extending the meeting by a day or two, or arranging double sessions, would be undesirable, as pointed out above, and would greatly increase the meeting expenses. Similarly, our policy of publishing as many papers as possible in our Rheology Issue would lead into expenses incompatible with our budget.

As of this date, the Program and the Executive Committee are divided between acceptance and return of the papers, but since the members in favor of acceptance are faced with the problem of solving the difficulties of accommodating the papers, those favoring keeping the number of papers to 20 will probably win.

The problem is obviously sufficiently basic to be discussed by the membership at the next Annual Business Meeting. The following questions might be raised and discussed:— Shall all papers be accepted which are submitted for presentation and satisfy a certain standard; on what basis shall papers be eliminated; if necessary, shall the Annual Meeting be set for more than three days, or double sessions be arranged; should there be more than one meeting per year and, if so, should they be in conjunction with a Physical Society or American Chemical Society Meeting; should the pattern of the Faraday Society be followed, whereby all papers are preprinted and circulated to the interested members for a small fee, and the meeting be restricted to discussion only; how should the publication policy be revised to provide an adequate collective appearance of the Meeting papers; is the membership prepared to have the dues raised to finance any extended operations ?

In view of the importance of the answers to these questions for the future of the Society, the sentiments of the membership will be most valuable in guiding the Executive Committee in its decisions. In this connection, the Editor may be permitted to indicate his own views by quoting a passage from a recent letter by Dr. R. Spencer, the preceding President of our Society:

> *"It seems to me that this situation is a natural result of an inconsistency. On the one hand we have favored growth in membership and greater diversity of fields, both in our membership and in our programs. At the same time we have tried to keep our annual meetings in a pattern which is more characteristic of a small, closely-knit society. I seriously doubt that we can have it both ways. It would be better, I feel, to let the Society grow along with the field of rheology, and to adopt our programs and publication policies to fit the changing situation."*

PREVIEW OF THE FALL MEETING

Our Annual Fall Meeting is set for November 2-4 in New York at the Hotel Henry Hudson. The tendency of these meetings in recent years to attract more and more contributors, or may be the increasing activity of our Program Committees, has brought a record crop of papers, so much so that it is doubtful that they can all be accepted (see the article "Large or Small ?"). It will interest our members to learn which papers were submitted so that they can obtain a more complete picture of what is moving in Rheology, unencumbered by cuts that may become necessary for the sake of economy. A final Program will be found in the Fall Issue of this Bulletin, about four weeks before the Meeting.

RHEOLOGY BULLETIN
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The following are the entries so far received by the Program Committee:

Energy Content of Plastically Deformed Metals
M. B. Bever, M.I.T.

Influence of Vacancies and Interstitials on Rheological Properties of Some Face Centered Cubic Metals
Speaker to be Announced. North American Aviation.

Cold Work-Annealing in Brass
Arthur Damask, Brookhaven.

Tests with Variable Stress Ratios in the Plastic Range
Aris Phillips, Yale.

Stresses and Strains in Nosing of Tubes
E. T. Onat and W. Prager, Brown U.

Prediction of Stress-Strain Curves and Stress Relaxation from Creep Data on Copper
W. N. Findley, Brown U.

Deformation in the Earth
J. Handin, Shell Development.

Magnetohydrodynamics and Magnetogasdynamics
S. I. Pai, U. Maryland.

Theory of Deformation of a Porous Viscoelastic Anisotropic Solid
M. A. Biot, (consultant) Shell Development.

Stress-Strain Relations for Soils
D. C. Drucker, Brown U.

Flow Patterns in Glacier Ice
L. E. Nielsen and F. D. Stockton, Monsanto.

Rheological Studies of Synovial Fluid
M. G. Levine and D. H. Kling, Boyar-Kling Arthritis Clinic.

Hypoelasticity
C. Truesdell, Indiana U.

Behavior of Navier-Stokes Equation with Added Memory Term
C. M. Tchen, National Bureau of Standards.

Mathematical Structure of Stress-Strain Relations for Viscoelastic Materials
E. H. Lee, Brown U.

Determination of Relaxation Distribution Function of Elastomers from Constant Stress-Rate Data
T. L. Smith, Jet Propulsion Lab.

Exact Calculation of Distribution Functions from Analytical Stress Relaxation Data
P. J. Blatz, Aerojet Corporation.

Viscoelasticity of High Polymers
E. R. Fitzgerald, Penn State U.

Viscoelasticity of High Polymers
A. V. Tobolsky, Princeton U.

Dynamic Bulk Modulus of High Polymers
R. S. Marvin, National Bureau of Standards.

Flow Properties of Molten Polyethylene
W. Philippoff, Franklin Institute.

Dynamic Viscosity and Sheer Modulus of Molten Polystyrene as a Function of Molecular Weight
W. P. Cox, Monsanto.

An Unusual Extrusion Process for Teflon
J. P. Tordella, du Pont.

Mechanical Behavior of Viscoelastic Fibers
F. Akutowicz, American Viscose.

Determination of Stress-Strain Curves of Filaments at High Rates of Shear
J. Smith & F. McCrackin, National Bureau of Standards.

Changes in Viscosity Induced by Radiation and Pyrolysis in Organic Liquids
Speaker to be Announced. North American Aviation.

Visualization of Liquid in Liquid Flow Patterns
A. S. Friedman, National Bureau of Standards.

The Determination of Structure in Dispersions of Viscometry
R. R. Myers, J. C. Miller and A. C. Zettlemoyer, Lehigh U.

A. Peterlin, Ljubljana, Yugoslavia.
Title of Lecture to be Announced.

Properties of Aluminum Soap Hydrocarbon Mixes
W. Philippoff, Franklin Institute.

Investigations on the Dynamic Properties of Asphalts
W. Philippoff, Franklin Institute.

A Special Flow Phenomenon in All Viscoelastic Liquids
J. P. Tordella, du Pont.

A Novel Capillary Viscometer
E. H. Mertz and R. Colwell, Monsanto.

Vibratory Gyro Mass Flowmeter
W. Roth, Roth Laboratory.

A Method of Identifying Photoelastic Properties by Contours
R. R. Myers, Lehigh U.

An Automatic Rotational Viscometer for the Measurement of non-Newtonian Materials
P. W. Kuhns and R. N. Weltmann, NACA.

Construction of a New Elastoviscometer
L. E. Nielsen and R. Keeney, Monsanto.

TWO RHEOLOGY ISSUES

In the preceding bulletin we indicated that it might be come necessary to divide this year's Rheology issue in order to accommodate the papers presented at the Fall Meeting in 1954 without burdening the hospitality of any single journal.

The editor is now glad to report that his negotiations were successful. Approximately half of the papers will appear in the Journal of Applied Physics in July 1955, and the other half in the September issue of the Society of Plastics Engineers Journal which, however, will be distributed in August 1955. Each of the journals have agreed to print a complete list of all the papers given at the Fall meeting, so as to preserve the collective character of our publication. Needless to say that every member will receive two copies this year, increasing the value of the membership in our society.

These arrangements have not been possible without a substantial disimbursement. This could be afforded because of the healthy financial condition of our society, largely due to the successful publication policy during the previous years. Similar outlays may become necessary and desirable from time to time but could not be sustained on the present level of membership dues. At the same time, the number of papers presented at our Fall meetings is still rising so that a revision of our publication policy, this or next year, will become inevitable. Together with the questions outlined earlier in this bulletin, the opinion of the membership with respect to publication policy will be canvassed at our Annual Business meeting in November.

SOCIETY OF RHEOLOGY

Statement of Financial Condition

December 31, 1954

Cash on hand, January 1, 1954			$1,048.64
Received from Treasurer of Society of Rheology			2,527.08
1953 interest on bonds not banked until 1954			8.75
			$3,584.47
Cash received during 1954:			
Dues ($465.94 for 1954; $1,063.20 for 1955		$1,529.14	
Interest on bonds		17.50	
Net income from sales of Journal of Rheology		7.77	
Cash received at meeting:			
Registration fees	$195.00		
Sale of dinner tickets	253.50	448.50	2,002.91
			$5,587.38
Disbursements:			
Contribution to A.I.P.		$ 171.40	
Publication cost — Journal of Applied Physics		467.50	
Bulletins expense — printing and mailing		238.71	
Meeting expense:			
Dinner	$266.50		
Social evening	106.87		
Dinner Tickets	6.63		
Miscellaneous	17.00	397.00	
Collection of 1955 dues:			
374 @ $.25	$ 93.50		
Postage	11.22	104.72	
Memberships in Foreign Societies		8.87	
Secretary - Treasurer's office expense		179.30	
Bingham Medal engraving		6.38	
Total disbursements			1,573.88
Balance in account, 12/31/54			$4,013.50

AMERICAN INSTITUTE OF PHYSICS INCORPORATED

Extracts from Minutes of Meetings of General Interest

Annual Meeting, February 26, 1955

The Annual Meeting of the members of the American Institute of Physics, Incorporated, was held at the office of the Institute, 57 East 55th Street, New York 22, N. Y., on February 26, 1955, at 11:30 a.m. Those present in addition to the proxies were H. A. Barton, Director, Kathryn Setze, Assistant Treasurer, and Mary Ann Lee, Assistant to the Secretary. Karl K. Darrow, proxy for the American Physical Society, was Chairman. Mr. Waterfall, Secretary of the Governing Board, served as secretary of the meeting. Authorizations of proxies for Member Societies, duly signed by the President and the Secretary of each Member Society respectively, had been received.

The Director, H. A. Barton, presented a report of the operations of the Institute for the year 1954 which was followed by a brief discussion. In the absence of the Treasurer, the Secretary distributed copies of a Balance Sheet and a Summary Statement of Operations for the year ending December 31, 1954 and commented on various items. He explained that the annual audit of the Institute books has been completed and that copies of the official audit will be sent to the Secretaries of the Member Societies. The Secretary reported that, in accordance with Article VIII, Section 2, of the Constitution, the Member Societies had nominated candidates for election to the Governing Board. On motion, it was voted unanimously to elect the nominees of the Member Societies to membership on the Governing Board of the Institute for the terms indicated.

The Secretary reported that an election by mail ballot of the Members and Associate Members in 1954 resulted in Allen V. Astin receiving the largest number of votes and becoming Member-at-Large to the Governing Board till 1958.

Executive Committee Meeting of March 11, 1955

The Secretary, Dr. W. Waterfall, reported that Dr. Gray had now completed his report on the Russian Translation project. Before the meeting, the Secretary had circulated copies of the report to members of the Commitee along with copies of a proposed letter addressed to the National Science Foundation requesting that NSF agree to underwrite the publication of a Russian translation journal by the Institute, and grant the sum of $40,000 to cover the anticipated first year's deficit of the journal. The following motion was made, seconded, and passed without dissenting vote:— "MOVED that the Committee approve the submission of Dr. Gray's report to the National Science Foundation and that the Institute submit the aforementioned proposal letter to the Foundation".

The Director explained that the Scientific Manpower Commission had been making considerable progress and that continued support of the Commission by the Institute was desirable. The following motion was made, seconded, and passed: "MOVED that the AIP contribute $1000 in 1955 to support the work of the Scientific Manpower Commission".

The Director said that Editor Davis had found that outside organizations had shown more interest in using the facilities of PHYSICS TODAY to publicize their activities than had the Member Societies. It was suggested that the Member Societies might make more use of PHYSICS TODAY if the Editorial Board contained members designated by the Member Societies to represent them, and voted that: . . . . "each Member Society be invited to nominate a representative and assign him the responsibility of furnishing Society news to the Editors of PHYSICS TODAY".

Meeting of the Governing Board, March 12, 1955

The Secretary reported that the committee appointed to make arrangements for the Twenty-Fifth Anniversary Meeting of the Institute in 1956 had met and agreed upon broad outlines for the program. Negotiations are now in progress with New York Hotels to obtain acceptable facilities at a suitable time. Details will soon be finalized.

There was considerable discussion of the inter-relation between Institute and Society-owned journals and of the increasing difficulty faced by the PHYSICAL REVIEW in publishing all material submitted to it. Previous efforts to interest the Physical Society in taking over the Journal of Chemical Physics were discussed. The comment was made that Institute-owned journals must increase the number of pages they publish if they are to bear their share of the total publishing load in physics. This was countered by a statement that Institute-owned journals must take cognizance of how much subscribers are willing to pay and the majority of subscribers are not members of the Institute nor Member Societies. It was suggested that Institute-owned journals should be deficit operations and that the dues percentage collected from Member Societies should be applied to the cost of publication. If more money is needed, the percentage of dues collected from Societies should be increased. This point of view was objected to on the grounds that some Member Societies are having no difficulty in financing their publications and would not appreciate having to pay more to support publication of Institute-owned journals.

Determination of the amount of dues percentage to be paid by Member Societies had been purposely deferred until after the discussion of the Institute-owned journals. It was explained that the percentage of dues collected from Member Societies had been set at 10% for the past several years and it was suggested that it be set at the same figure for 1956 unless good reasons could be given to the Member Societies for increasing it. After some discussion the following motion was made and carried: "MOVED, that ten percent (10%) of the dues collected in 1955 be set as the amount to be contributed by each Member Society for the support of the Institute for 1956".

THE BRITISH SOCIETY OF RHEOLOGY

Being persistently very active, the British Sister Society has kept up the literature abstract service in their Bulletins (available for $1.00 per issue) that some of our members, too, have found quite useful. Their meetings included one on "Relaxation and Flow in Glasses", held on January 28, 1955, in London, and reported on in Nature 175, p. 747 (1955), and one on "Visco-Elastic Behaviour", held on April 29, 1955, in Newcastle, which featured the following lectures:

Visco-Elastic Behaviour of Methyl Methacrylate Systems
L. J. Wood and A. Phillips.

Visco-elasticity in Fibre Systems
A. S. Lodge.

Recent Advances in the Goniometry of Flow
K. Weissenberg.

Experiments on the Plasticity of Soil
E. G. McEwen and B. F. Willets.

Determination of Relaxation-Time Spectra from Mechanical Measurements on Solids
H. Kolsky and F. C. Roesler.

Some Properties of Plastically Deformed Alkali Halides
J. E. Caffyn and L. Goodfellow.

Relaxation Processes in Glass
P. L. Kirby.

Propagation of Ultrasonic Shear Waves in Visco-elastic Substances
A. W. Pryor and E. G. Richardson.

The next Annual Meeting is planned for mid-September, 1955, and will take place at the University College, Exeter.

RHEOLOGY IN JAPAN

The rapid rise in interest in Rheology and the rheological approach in Japan has been earlier commented on. Below, we will give a brief report on the 3rd Rheology Symposium held in November, 1954 by the Rheology Committee of the Chemical Society of Japan, under the joint auspices of the Physical and the Highpolymer Society of Japan. Two invited lectures were held, by H. Horio on ""Textile Industry and Rheology", and by H. Takenoku on "Phenomenological and Molecular Aspects of Rheological Behavior". The following contributed papers were given (Abstracts were printed, one copy is on hand):

Non-Newtonian Viscosities in Dilute Aqueous Solutions of Sodium Carboxymethylcellulose
H. Fujita and T. Homma.

Dynamic Properties of Concentrated High Polymer Solutions
H. Hirai and S. Onogi.

The Internal Timescale of High Polymers
S. Onogi.

Rheology of Concentrated Solutions of Linear Polymer
M. Yamamoto and H. Inagaki.

On the Thermo-Reversible Sol-Gel Transition
K. Yokokura and Y. Kobatake.

Rheological Properties of Some Polymerized Oils
T. Nakagawa

Rheological Behaviour of Nitroglycerine-Nitrocellulose Gel
T. Okawa.

On the Viscoelastic Properties and Skiing Quality of Ski Wax
G. Shinoda and M. Shimbo.

The Second Order Transition Temperature of High Polymer Systems
N. Hirai.

Meaning of Frozen State of High Polymers
J. Furukawa.

Viscoelastic Behaviour of Polyvinyl Acetate Films
Ryeum Seung Keun.

Studies of High Polymers by Ultrasonics
Y. Maeda.

On the Hysteresis and the Non-Linear Vibration Characteristics of Textile Materials
T. Manabe.

Study on the Frequency Dependence of Internal Friction of Several Textile Fibres
K. Fujino, H. Kawai, T. Horino and K. Miyamoto.

On the Dynamical Behaviour of the Rubber Vibration Absorber under the Test of Constant Rate of Loading
Y. Sawaragi and N. Sugai.

On the Dynamical Behaviour of the Natural Rubber Stocks in the Vibration Test
Y. Sawaragi and H. Tokumaru.

Interpretation of Mechanical Behaviour of Viscose Rayon by a Classical Mechanical Model
I. Sakurada.

Another Meeting is going to be held this Summer.

INTERNATIONAL MEETINGS

Some of the more important International Meetings this year which are of potential interest to members, will be quoted below. A roster of National and Local Meetings would take too much space, and the announcements are available in the respective Journals, especially in PHYSICS TODAY.

2nd International Seaweed Symposium,
Trondheim, Norway — July 14-16.

14th International Congress of Pure & Applied Chemistry,
Zurich, Switzerland — July 21-27.

Symposium on Macromolecular Chemistry,
Zurich, Switzerland — July 28-29.

International Union of Leather Chemists Societies,
3rd Biennial Conference,
Stockholm, Sweden — August 1-5.

Symposium on Gas Dynamics, Northwestern University and American Rocket Society,
Evanston, Illinois — August 22-24.

International Wool Textile Research Conference,
Sydney, Australia — August 22 - September 9.

International Association for Hydraulic Research,
6th Plenary Meeting,
Delft, Netherlands — August 29 - September 2.

British Association for the Advancement of Science,
Annual Meeting,
Bristol, England — August 31 - September 7.

Chemical Institute of Canada, Physical Chemical Division,
Montreal, Canada — September 8-9.

Society of German Chemists, General Assembly,
Munich, Germany — September 12-17.

Symposium on Cavitation in Hydrodynamics,
National Physical Laboratory,
Teddington, England — September 14-17.

Symposium on The Less Common Metals,
London, England — September 22-23.

Symposium on Deformation and Flow in Solids,
International Union of Theoretical and Applied Mechanics,
Madrid, Spain — September 26-28.

10th International Road Congress,
Istanbul, Turkey — September 26 - October 1.

Symposium on The Mechanism of Phase Transformation in Metals, Institute of Metals,
London, England — Autumn, 1955.

HARRIS' HANDBOOK OF TEXTILE FIBERS

MILTON HARRIS, Editor;
Published by Harris Research Laboratories, Inc.
Washington, D. C., 1954;
356 pages, largely Tables and Figures; $12.50

This new Handbook presents a tremendous wealth of information in a concise and well laid out form. It covers Natural and Synthetic Fibers, their sources, structure and constitution, their mechanical, optical, electrical, thermal and frictional behavior among the physical, and sorption, swelling, binding, dyeing, stability and aging among the chemical properties. There are excellent chapters on identification, biological attack, engineering tables, etc. Especially recommended may be the chapters on Microscopy by C. W. Hock, and on X-ray Diffraction by J. A. Howsman. Other most helpful compilations are those of textile terms and definitions, and on the names, sources and uses of fibers.

While no work of this type can ever hope to be complete, this book is of unique usefullness as a source of factual, numerical information, and will save countless hours of literature search. It is arranged in a most readable manner and further valuable as supplying data in conjunction with recent monographs on fibers and fiber formers. It will find its way to the desk of every textile man, whether in science, engineering or production.