

THE
BRITISH SOCIETY
OF RHEOLOGY

BULLETIN — No. 3, 1967

Hon. Secretary :

DR. B. S. NEUMANN,
Fullers' Earth Union Ltd.,
Nutfield Road,
Redhill, Surrey.

Hon. Editor (Bulletin) :

DR. D. W. HADLEY,
J. J. Thomson Physical Laboratory,
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Reading, Berks.

B.S.R. BULLETIN NO.3. 1966

STOP PRESS SUPPLEMENT

New Council Members

At the AGM held at Shrivenham, 19.9.67, Dr. K.M. Beazley (English Clays Lovering Pochin Ltd., St. Austell) and Dr. J. Harris (Bradford University) were unanimously elected to the Council. All officers remain as before.

URGENT

ABSTRACTORS REQUIRED

Due either to retirement of the previous abstractor, or because the journals in question have not previously been covered, abstractors are required immediately for the following publications.

Applied Mechanics Reviews (main article)	Journ.Roy.Soc., Edin.
Chem. Engng. Progress	Kolloid Zeits.
Chem. and Process Engng.	Macro. Chem.
? — Comptes Rendues	Macro. Phys.
Japan. Journ. Appl. Phys.	Phys. of Fluids.
Journ. Canad. Inst. Chem. Eng.	Rheol. Acta. — ?
Journ. Colloid Sci.	Trans. Inst. Chem. Eng.
Journ. Japan. Phys. Soc.	Z. Phys. Chem., Frankfurt.
Journ. Mech. Phys. Solids	Z. Phys. Chem., Leipzig.

Please send offers of help to Mr. B. Warburton, School of Pharmacy,
University of London, Brunswick Sq., London, W.C.1.

The Society of Glass Technology announces a lecture on "Glass Technology in 1967", to be delivered by Professor R.W.Douglas (Past President B.S.R.) at Lemington Glass Works, Newcastle, 7.0 p.m., 25 October.

Guests will be welcome.

THE 1967 GOLD MEDAL COMPETITION FOR APPLIED RESEARCH IN RHEOLOGY

The medal was to have been awarded for "the best contribution to the solution of an industrial problem by the application of fundamental rheological knowledge."

Seven entries were received and considered by the Research Committee. The papers varied greatly in length and quality, in some cases the standard being disappointingly low, with little evidence shown of the preparation that might have been expected for a Gold Medal Competition.

Several papers described work that would help in the understanding of engineering problems and aid long-term improvement of techniques and processes, but it was the unanimous view of the Committee that there was no paper which really met the conditions for the award. The Committee has therefore advised the Society that no award should be made this year, and has suggested that the next competition should be held in 1969.

RHEOLOGICAL RESEARCH IN BRITAIN, 1966 (N.E.L. Report No. 292)

The report* contains almost twice as much information as its predecessor of 1964, and due to the assiduous work of its compilers gives a much more balanced picture of research in progress than did the earlier document.

It is hoped to prepare a fuller comparison between the report and B.S.R. membership than was possible for the survey published in Bulletin No. 1, 1967. The preparation will, almost certainly, require considerable time, since the report lists 748 workers in 412 establishments. In many cases only the head of a research group is named, sometimes only one name per establishment being given. From personal knowledge a group may contain several professionally qualified workers; indeed, several members of the Society are not listed in the index to the report because of the system followed.

A cursory glance at the report shows inevitable, but sometimes surprising, omissions. Paints get badly dealt with, neither the Paint Research Station nor I.C.I. Paints Division receiving an entry. Two familiar (to the Editor) names are missing: A. Graham, whose work on mechanical properties of alloys is well known to most members; and N. G. McCrum, a prominent figure in the world of polymer physics.

The above remarks should not be interpreted as a denigration of the impressive and invaluable report prepared by Mr. Hayward and his colleagues, but should emphasise that there are many more active

rheologists in Britain than might have been assumed earlier. Therefore this Society has a greater potential for growth than previously considered. The N.E.L. report shows those areas in which the largest growth ought to occur, and all possibilities for improving the Society's attraction for workers in *all* areas of rheology need to be exploited as fully as possible.

The Introduction to the N.E.L. report states that "It is still painfully evident that British research in the field of rheology is not sufficiently industry oriented. There must be a large number of laboratories interested in rheological phenomena for their own sake, with no interest in practical applications." Confirmation of this statement is given by the smallness of the response to the Society's Gold Medal Competition, which was even more disappointing than there being not one entry which satisfied all the conditions stipulated. Improving the existing structure of rheological research is surely a matter in which the whole Society, and not as at present merely a few of its members, could, and ought to, play a useful role.

* Rheological Research in Britain, 1966; N.E.L. Report No. 292; A. T. J. Hayward, Mrs. A. C. Findlay and G. Gibb; Ministry of Technology, May 1967.

Copies obtainable from National Engineering Laboratory, East Kilbride, Glasgow.

THE CLASSIFICATION OF RHEOLOGICAL PAPERS

The Institution of Chemical Engineers and the Research Committee of B.S.R. have formed a joint working party to study the classification of published papers in rheology.

After some internal field trials a classification scheme has been prepared to cover fluid systems. The initial object is to yield a mechanism for assessing the amounts of work accomplished in different fields, the information being recorded using 70 peripheral-hole filing cards. It is hoped that the scheme will later cover solids and the flow of powders, and may eventually form the basis of a retrieval system.

The Editor of Rheology Abstracts hopes to apply the scheme experimentally in 1968, and has asked for the co-operation of all abstractors in appending the relevant classification code(s) at the end of each abstract. It is thought that the procedure will assist abstractors in the selection of abstracts.

Some general notes on the use of the classification are given below.

1. This classification has not been designed as a retrieval system, but to provide a mechanism for assessing the relative amounts of work published in various fields of interest, and to some extent describing such work.

2. Ideally all abstracts should contain information on as many as possible of the following main divisions:
 - A. Type of paper (Theoretical, Review, etc.).
 - B. Language.
 - C. Type of fluid (Polymer melt, colloid, etc.).
 - D. Rheological Property (Newtonian, viscoelastic, etc.).
 - E. Flow Character (Laminar Oscillating, etc.).
 - F. Bountary Geometry (Pipe, moving boundary, etc.).
 - G. Main variables (Pressure, Structure, Molecular weight, etc.).
 - H. Theoretical approach (e.g. molecular behaviour, boundary layer theory, etc.).
 - I. Apparatus type (e.g. ultrasonic, etc.).
 - J. Field of immediate application (e.g. Extrusion, Mixing, etc.).

It is realised that not all papers will fall into all categories, in particular, sections G, H, and J may not be relevant. For "Application" it is felt that only work related directly and immediately to the field should be included.

3. If a classifier is not *certain* of a category he should not include it: from our point of view, omission of a doubtful category is much less harmful than an incorrect inclusion. It is thought that if the system works properly even an unskilled classifier would produce valuable data.
4. No attempt has been made to prepare a glossary of constitutive equations or of descriptions of specific materials (e.g. butter or C.M.C. solutions). These would both be valuable as an adjunct to this classification system.
5. There is a list of key words (with examples of related topics to be included under the same heading) and a cross-index that should be used in all cases of doubt.

A fuller description of the system will appear in Rheologica Acta, and later in this Bulletin.

NOTES CONCERNING THE PRESENTATION OF PAPERS AT B.S.R. MEETINGS

The following notes have been compiled for the guidance of inexperienced contributors to B.S.R. conferences. It is proposed they be sent as a matter of routine to *all* contributors, as it is obviously inappropriate for the organiser to try to judge in advance the likely quality of the *presentation* of a paper, as distinct from its technical content.

1. The work presented should be new to the audience, or newly interpreted.
2. To actually read a paper to a meeting is pointless. Normally it contains too much material, and anyway the audience have come for the privilege of hearing the speaker's mind at work. They can read the full paper later if it is worthy of publication.
3. A speaker should use a reasonable part of his time introducing his subject. Rheologists come under many "primary" academic headings and from many technological backgrounds. Only a very small proportion of a B.S.R. audience will be *au fait* with the background to a particular paper.
4. If in the remaining time the speaker can "put over" *three or four* important or novel ideas or facts, he will be doing very well. One or two may be sufficient.
5. Many speakers try to do too much in the available time, with the result that the audience remember none of it. They will be more impressed, and pleased, by the unhurried presentation of about half the material the speaker originally intended to present.
6. Nothing wastes time more effectively than slides shown in rapid sequence, especially if they contain tables of illegible numbers, or vast mathematical formulae.
7. The exception to 6 is the speaker who cannot be heard. If he speaks as though to those members of the audience whose mother tongue is not English, he will probably make a good presentation.
8. The presentation of a paper should elicit relevant discussion. Therefore, unless the programme specifically makes other provision, the lecturer should finish 10-15 minutes before his time is up. (Discussion should be allowed to follow immediately after each paper.)
9. A speaker should make sure in advance what mechanical blackboards, projection facilities, etc., will be available, and check with the organiser that somebody will know how to work them.

These notes are being distributed as an experiment to those people who have kindly offered to contribute to the meeting at Shrivenham in September 1967. They are the responsibility of the undersigned, not of the Council of the Society, although the latter has agreed in general principle that "something should be done." If any of the contributors think the notes deserve comment, favourable or unfavourable, their author would like to know.

M. F. CULPIN.

RHEOLOGY ABSTRACTS

New journals appear each month, and it is vital that these be covered for Rheology Abstracts. If you know of any periodical not

yet abstracted please contact the Editor (Abstracts): Mr. B. Warburton, University of London, College of Pharmacy, 29-39 Brunswick Square, London, W.C.1.

Abstractors are required for the following recent, or proposed, journals:

Journ. Macromolecular Chemistry;
Journ. Macromolecular Physics;
Journ. Materials Science;
Materials Science and Engng.;
Revs. Macromolecular Chemistry;
Revs. Polymer Processing and Technology.

A new abstractor is required for *Kolloid Zeitschrift*.

A CONFERENCE ON EXPERIMENTAL RHEOLOGY UNIVERSITY OF BRADFORD, 17th-19th APRIL 1968

It is proposed to hold a Conference on Experimental Rheology at the University of Bradford on 17th-19th April 1968. The Conference will provide a forum for the discussion of the efficient acquisition and processing of rheological data and it is also hoped to attract papers on the management of experimental research in rheology. Papers in the following categories would be particularly welcome:

Instruments and Techniques

- (a) Analysis and calibration of instruments.
- (b) New instruments.
- (c) Evolution of existing instruments.
- (d) Peripheral and auxiliary equipment.
- (e) Data acquisition and handling (including computer programmes).
- (f) Material preparation and classification.

Management

- (a) Planning research programmes.
- (b) Planning educational programmes.
- (c) The organisation, layout and manning of a rheology laboratory.

Proposals for papers to be included in the programme can be made in the form of a synopsis of about 200 words. Papers not falling exactly into any of the above categories, but which nevertheless are within the scope of the Conference, will also receive close consideration. It may also be possible to place shorter contributions and research notes.

In addition to the presentation of papers and comments, contributions in the form of instruments for display and informative literature

will also be welcome. Intending exhibitors are invited to advise the Conference Secretary of their space and services requirements at the earliest possible date.

The deadline for all proposals is 15th December 1967.

Conference Secretary, Dr. J. Harris, Department of Chemical Engineering, University of Bradford, Bradford 7.

VICTORIAN BRANCH MEETINGS

The seventh Annual General Meeting was held at Melbourne University on 2nd August 1967. After the meeting Dr. W. Boas, Chief of C.S.I.R.O. Division of Tribophysics, spoke on "Crystal Defects and the Strength of Materials." Types of defect were considered on the atomic scale and their interaction for various properties described. The development and application of ultra high-strength materials was then discussed.

The next meeting of the Branch will be on 1st November, when Dr. D. Boger, of the Department of Chemical Engineering, Monash University, will speak on "The Flow of Viscoelastic Fluids."

NOTES AND NEWS

The Institutions of Chemical and Mechanical Engineers, with financial backing from the Ministry of Technology, are producing a series of Design Data Memoranda. The first four subjects, published on 25th July, include approximate data on the viscosity of common liquids.

The Physics Exhibition, 1968 will be held at Alexandra Palace, London, 11th-14th March. Firms and laboratories interested in submitting proposals of exhibits should communicate with the Exhibitions Officer, The Institute of Physics and Physical Society, 47 Belgrave Square, London, S.W.1. All expenses are paid for exhibitors from academic institutions, and no charges are made for participation. New teaching experiments will be welcomed for consideration, as well as research and development exhibits.

A conference on "X-ray Techniques in Materials Science" will be held in London, 26th-27th October 1967. The object is to discuss new advances and applications of X-ray techniques, with particular reference to the correlation of physical properties with the structure of materials; orthodox techniques and applications will not be discussed. It is hoped to include an exhibition of some associated commercial equipment. Further details from The Meetings Officer,

Institute of Physics and Physical Society, 47 Belgrave Square, London, S.W.1.

The Institute of Physics and the Physical Society is arranging a conference on "The Physics of Liquids" at Norwich, 15th-18th April 1969. The conference will deal mainly with the properties of simple liquids, especially thermodynamics, transport properties, structure and dynamics. Emphasis will be on fundamentals rather than techniques. Further information may be obtained from the Institute in 1968.

The Society of Glass Technology, 20 Hallam Gate Road, Sheffield 10, announces the following meetings.

"Mechanical Strength of Glasses," Sheffield, 3rd-5th October 1967. (Abstracts of papers may be borrowed from Bulletin Editor.)

"Heat Transfer in Glass Manufacture," Ormskirk, 7th-9th January 1969. There will be sessions on melting, forming, annealing and measurement.

The University of Surrey has been forced to abandon its M.Sc. course in Rheology due to lack of support. Post-graduate lecture courses will, however, still be held. Two courses on Rheological Techniques, each of eight lectures, will be given on Wednesdays, 6.30-8.30 p.m., during the session 1967-68.

"Steady Flow Rheometry," by R. W. Whorlow, commencing 11th October 1967, will cover methods of obtaining and interpreting data for non-Newtonian solutions.

"Dynamic Measurements," by M. Braden and R. W. Whorlow, commencing 10th January 1968, will deal with the application of constant stress, constant strain and oscillatory stress to viscoelastic materials, and will discuss interpretation of the results.

The proposed M.Sc. course in Tribology at Reading University has been another victim of the current financial squeeze affecting all British universities. Despite the interest aroused it has been decided to postpone the course rather than attempt to hold it using inadequate facilities.

The A.S.M.E., A.S.T.M. and M.S.L.E. are collaborating to hold a symposium on "Lubrication and Lubricant Rheology" at the University of Michigan, 18th-20th March 1968. The object of the

symposium is to help obtain a better understanding of which rheological properties of lubricants are important, why they are important, how they are best obtained, and how they are employed to improve the lubrication of mechanisms. Further information from: Professor W. O. Winer, Department of Mechanical Engineering, 225 West Engineering Building, The University of Michigan, Ann Arbor, Michigan 48104, U.S.A.

Provided that at least 15 seats are booked members of the Society can obtain reduced rate air travel to attend the International Congress of Rheology, Tokyo, October 1968. The fare would be approximately £320 compared with a normal economy class return of £460. All enquiries to the Editor.

MEMBERS' ENQUIRY SERVICE

Members are reminded that the services of the Research Committee are available free of charge in answering queries of a scientific or technical nature relating to any aspect of rheology. During the past 18 months the Committee has considered problems submitted by five members.

It seems worth mentioning that several members have in the past found solutions to problems relating to experimental difficulties, or the impossibility of unearthing particular data, by inserting a notice in the Bulletin. The Editor would be pleased to see more use being made of this facility.

STOP PRESS NEWS

The Acoustics Branch of the Inst. of Physics is holding a meeting on "Viscoelasticity" in Glasgow on 19th December, 1967.

Dr. G. W. Scott Blair will address the S.W. Branch of R.I.C. in Plymouth on the evening of 10th November, 1967; his subject will be "Recent Developments in Rheology."

A one day symposium on "New-Newtonian Flow" will be held at Salford University on 12th December, 1967, under the auspices of N.W. Branch of the Inst. of Chemical Engineers. In addition to an introductory lecture, topics to be discussed include mixing, characteristics of impellers and gear pumps, and heating and cooling in stirred tanks. Further details from J. H. Sharp, Shell Chemical Co. Ltd., Carrington, Urmston, Manchester.

New Members

NAME AND ADDRESS	INTERESTS
P. S. Y. Chu, M.Sc.(Eng.), D.I.C., A.C.G.I., D.A.E., A.M.I.Mech.E., 45 Monics Drive, West Acton, London, W.3. Enfield Coll. of Tech., Queensway, Enfield, Middx.	General, lubrication, friction, wear.
D. M. Fisher, B.Sc., Grad.Inst.P., Flat 1, "Barracane," Waterloo Road, Crowthorne, Berks. I.C.I. Ltd., Paints Div., Wexham Road, Slough, Bucks.	Polymer solutions, paints, printing inks.
D. E. Marshall, B.Sc., Glyn Dyfi, Caradoc Road, Aberystwyth, Cards. Physics Dept., U.C.W., Penglais, Aberystwyth.	General, rubbers, polymers, polymer solutions.
H. A. D. Nandasena, B.Sc.(Eng.), Belmont Hall, Dundee. Dept. of Civil Engng, University of Dundee.	General, cement.
J. G. Williams, B.Sc.(Eng.), Ph.D., A.M.I.Mech.E., Bay Cottage, 50 Orchard Lane, Amersham, Bucks. Mech. Eng. Dept., Imperial College, S. Kensington, London, S.W.7.	General, metals, rubbers, polymers.
J. H. C. Young, B.Sc., Wellington Ho., 65 Wellington Road, New Brighton, Ches. B.T.R. Industries, Hornington Road, Burton-on-Trent, Staffs.	General, rubbers, polymers, polymer solutions.
D. W. Morrison, B.S. Mechanic St., South Amherst, Mass. 01002, U.S.A. Poly. Sci. and Eng., Univ. of Mass. Amherst, Mass. 01002.	Metals, rubbers, polymers, polymer solutions.
P. B. Alldritt, B.Sc., 65 Banff Street, Reservoir N 19, Victoria, Australia. Tyton Adhesives Co., Cromwell Street, Collingwood, Victoria.	
A. V. R. Murthy, B.Tech., M.E., Dept. of Chem. Eng., Monash Univ., Clayton, Victoria, Australia.	Viscoelastic fluids.