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THE
BRITISH SOCIETY
OF RHEOLOGY

BULLETIN — No. 4, 1960

Including
BOOKS ON RHEOLOGY

Hon. Secretary :

DR. M. F. CULPIN,
8 The Broadway,
Pontypool,
Monmouthshire.

Hon. Editor (Bulletin) :

MR. J. F. HUTTON,
"Shell" Research Ltd.,
P.O. Box No. 1,
Chester.



THE BRITISH SOCIETY OF RHEOLOGY

New Members

New South Wales Branch, Elected June, 1960.

NAME AND ADDRESS.	INTERESTS.
G. K. Adkins, c/o Wheat Industries (Aust.) Pty. Ltd. P.O. Box 543, Tamworth 4 N, N.S.W., Australia.	Starch and polysaccharide degradation products. Wheat flour and gluten. Raw suspensions and cooked aqueous pastes, BS/U tube methods, rotational methods.
M. R. Alexander, 21 Lucretia Avenue, Longueville, N.S.W., Australia.	Food products.
D. R. Axelrad, Dept. of Mechanical Engineering, University of Sydney, N.S.W., Australia.	Rheological measurements. Visco-elasticity in metals.
L. J. Baranyai, 29 Campbell Avenue, Normanhurst, N.S.W., Australia.	Theoretical aspects of viscosity, solubility and molecular weights.
C. V. Bennie, 60 Burnell Street, Fivedock, Sydney, N.S.W., Australia.	Suspensions of powders in liquids.
W. B. S. Bishop, 143 Beecroft Road, Beecroft, N.S.W., Australia.	Flour dough, starch paste and equipment for testing similar materials, including honey, cheese, chocolate (molten) 'creams'.
R. F. E. Bolton, 31 Delange Road, Ryde, N.S.W., Australia.	Industrial adhesives—'solutions' of starch dextrin, casein and polymers and synthetic resin emulsions. Control of dextrinisation of starch by viscometric methods.
Dr. F. Connors, Plastics and Rubber Dept., University of New South Wales, P.O. Box 1, Kinsington, Sydney, N.S.W., Australia.	All aspects of polymer science and engineering.
B. M. Graham, 10 Finch Avenue, Rydalmere, N.S.W., Australia.	Dough, theory.
Dr. T. L. Judell, Icianz Ltd., Plastics Factory, Denison Street, Matrville, N.S.W., Australia.	Flow properties of polyethylene.

NAME AND ADDRESS.	INTERESTS.
A. T. Martin, 61 Argyle Avenue, Ryde, N.S.W., Australia.	Viscosity measurement for process control. Measurement of impact strength, elongation, etc., of plastic materials. Extrusion and moulding of plastic materials.
Z. Mezey, c/o Bread Research Institute, Private Bag P.O. North Ryde, N.S.W., Australia.	Dough rheology and general rheology.
F. J. H. Ottaway, 19 Bent Street, Greenwich, N.S.W., Australia.	Dough rheology.
A. A. Palmer, Kanematsu Institute, Sydney Hospital, Sydney, N.S.W., Australia.	Flow of suspension in fine vessels, especially blood.
N. H. Penhall, 3 Fyall Avenue, Wentworthville, N.S.W., Australia.	Interests of general nature.
D. A. Tait, Icianz Ltd., Plastics Factory, Beauchamp Road, Matraville, N.S.W., Australia.	Plastic materials—in particular polyethylene.
L. B. Venn-Brown, 76 Elgin Street, Gordon, N.S.W., Australia.	Cement dispersion. Concrete workability. Creep in concrete.
F. A. Wickenden, c/o William Arnott Pty. Ltd., George Street, Homebush, N.S.W., Australia.	Wheat flour dough and flour testing equipment.
J. F. Williams, c/o William Arnott Pty. Ltd., George Street, Homebush, N.S.W., Australia.	Wheat flour dough. Physical properties of dough as determined by Brabender testing equipment.
B. A. Wilson, 503 Forest Road, Bexley, N.S.W., Australia.	General.
P. G. Woods, c/o Monsanto Chemicals (Aust.) Ltd., P.O. Box 4, Rozelle, N.S.W., Australia.	Plastics, polymer emulsions, etc.
N. W. West, 11 McMillan Road, Artarman, N.S.W., Australia.	Rheological properties of asphaltic bitumen.
J. T. Leonard, 67 Morrison Road, Gladesville, N.S.W., Australia.	Rheological instruments. Methods of usage with regard to Non-Newtonian materials.

NAME AND ADDRESS.

A. A. Sherwood,
Mechanical Engineering Dept.,
University of Sydney,
N.S.W., Australia.

D. W. Grover,
64 Lower Cliff Road,
Northwood,
N.S.W., Australia.

G. E. Hibberd,
44 Cowper Street,
Randwick,
N.S.W., Australia.

Elected 8th September, 1960.

NAME AND ADDRESS.

Prof. A. J. Kennedy,
College of Aeronautics,
Cranfield,
Bletchley,
Bucks.

N. Wilson,
422 Gidlow Lane,
Beech Hill,
Wigan, Lancs.

I. H. Hall,
14 Athol Road,
Bramhall,
Cheshire.

G. C. E. Karas,
High Branches,
Laburnam Way,
Dinas Powis,
Glam.

R. L. Brown,
16 Clarelawn Avenue,
East Sheen,
London, S.W.14.

Dr. J. Lamb,
7 Tudor Road,
Beckenham,
Kent.

F. A. J. Talman,
13 The Drive,
Shoreham by Sea,
Sussex.

Dr. J. F. Raffle,
Research Department,
Cementation Co. Ltd.,
Maple Cross,
Rickmansworth,
Herts.

R. S. Paige,
29 Frith Road,
Bognor Regis,
Sussex.

Dr. D. Tollenaar,
Inst. Voor Grafische Techniek,
Ter Gouwstraat 1, Amsterdam 0, Holland.

INTERESTS.

Transparent elastic solids of low elastic modulus.

General.

Surface rheology: dough rheology.

INTERESTS.

Metals.

Rheology of polymeric materials.

Rheology of high polymers.

Polystyrenes, polyethylenes, P.V.C. Dynamic mechanical testing, extrusion rheometry, creep.

Powders.

Viscoelastic behaviour, rate of strain effects, rotational viscometry, ultrasonic absorption.

Rheological properties of pastes and emulsions.

Flow of liquids and quasi liquids. Flow nets, etc.

Rotational viscometry, particularly in connection with the Weissenberg Rheogoniometer.

Rheology in Printing Inks.

News of Members.

We have been notified of the following changes of address:

BULLOUGH, R. K., DR.

Dept. of Mathematics, Manchester College of Science and Technology, Sackville Street, Manchester 1.

DAVIDSON, I. S., MR.

Tullis Russell & Co. Ltd., Markinch, Fife.

ELMES, P. C., DR.

26 Cranmore Avenue, Belfast 9.

FARROW, P. A. T., MR.

Farol Research Engineers, North Bersted, Bognor Regis, Sussex.

JOPLING, D. W., MR.

Research Laboratories, Kodak Ltd., Wealdstone, Harrow, Middlesex.

KAYE, A., MR.

The College of Aeronautics, Cranfield, Bletchley, Bucks.

MORETON, D. H.

"Borrowdale", Edington, Nr. Bridgwater, Somerset.

PEARSON, J. R. A., DR.

23B, Chaucer Road, Cambridge.

SAUNDERS, D. W., DR.

The College of Aeronautics, Cranfield, Bletchley, Bucks.

WARD, S. G., PROF.

Dept. of Mining and Minerals Engineering, The University, Edgbaston, Birmingham 15.

We invite all Members, both new and old, to send in news about their activities in the field of rheology. For example: about their new job, which often accompanies a change of address; about their change in status; about their awards and honours; about journeys and new contacts they have made.

Recent Meetings.

The last meeting of the British Society of Rheology was held in Swansea on 8th-10th September, 1960. Accommodation was provided in Neuadd Gilbertson a hostel of the University. Papers on the Rheology of Polymers were presented in the lecture theatre of the Natural Sciences Building in Singleton Park. The meeting was well attended by Members, and visitors from the U.K. and overseas. A highlight the technical session was the Presidential Address by our retiring President, Dr. H. Kolsky, who spoke on aspects of his own field of research, the propagation of stress waves in solids.

Since the last visit of the Society in 1957, building in Singleton Park has continued on an extensive and impressive scale. It is far from

**THE
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BOOKS ON RHEOLOGY

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The following bibliography is a revised edition of one published in 1956 in the Bulletin of the Society. The list has been extended, mainly by the inclusion of more recent publications, and it is hoped that it includes all important books in the English language as well as a few in other languages.

The books have now been classified under four headings: general discussion and theory; particular materials; conference reports; and periodicals. The allocation of some books under a particular heading has been rather arbitrary, particularly in the case of those books in the second section which are of fairly general interest.

The compiler would like to thank Mr. R. F. Eatwell, A.L.A., Librarian of Battersea College of Technology, for his assistance in locating information.

R.W.W.

General Discussions and Theory.

Acad. Sci., Amsterdam.

First Report on Viscosity and Plasticity. Amsterdam, North-Holland Pub. Co., 2nd Edition 1939, 267 p.

Acad. Sci., Amsterdam.

Second Report on Viscosity and Plasticity. Amsterdam, North-Holland Pub. Co., 1938, 287 p.

Andrade, E. N. da C.

Viscosity and Plasticity. Cambridge, W. Heffer & Sons, 1947, 82 p.

Barr, G.

A Monograph on Viscometry. Oxford, University Press, 1931, 318 p.

Bergen, J. T. (Editor).

Viscoelasticity—Phenomenological Aspects. New York, Academic Press, 1960, 150 p.

Bingham, E. C.

Fluidity and Plasticity. New York, McGraw Hill, 1922, 440 p.

Blair, G. W. Scott.

An Introduction to Industrial Rheology. London, J. & A. Churchill, 1938, 158 p.

Blair, G. W. Scott

A Survey of General and Applied Rheology. London, Sir Isaac Pitman & Sons, 2nd Edition, 1949, 330 p.

Bland, D. R.

Theory of Linear Viscoelasticity. London, Pergamon Press, 1960, 124 p.

Bowden, F. P. and Tabor, D.

The Friction and Lubrication of Solids. Oxford, Clarendon Press, 1954, 337 p.

Bowden, F. P. and Tabor, D.

Friction and Lubrication. London, Methuen & Co., 1956, 150 p.

- Bridgman, P. W.
Studies in Large Plastic Flow and Fracture. New York, McGraw Hill, 1952, 362 p.
- British Standards Institution.
Methods for the Determination of the Viscosity of Liquids in C.G.S. Units, B.S 188 : 1957. London, British Standards Institution, 1957, 64 p.
- De Bruyne, N. A. and Houwink, R. (Editors).
Adhesion and Adhesives. London, Elsevier Pub. Co., 1951, 532 p.
- Burgers, J. M. and Blair, G. W. Scott.
Report on Principles of Rheological Nomenclature. Amsterdam, North-Holland Pub. Co., 1949, 72 p. (Normally bound as part of Proc. First Internat. Rheol. Cong.).
- Eirich, F. R. (Editor).
Rheology: Theory and Applications. New York, Academic Press, Vol. I, 1956, 761 p.; Vol. II, 1958, 591 p.; Vol. III, 1960, 680 p.
- Flugge, S. (Editor).
Encyclopedia of Physics, Vol. 6, Elasticity and Plasticity. Berlin, Springer-Verlag, 1958 642, p.
- Frenkel, J.
Kinetic Theory of Liquids. Oxford, Clarendon Press, 1955, 488 p.
- Goodier, J. N. and Hodge, P.G.
Elasticity and Plasticity. New York, John Wiley & Sons, London, Chapman & Hall, 1958, 152 p.
- Green, A. E. and Zerna, W.
Theoretical Elasticity. Oxford, Clarendon Press, 1954, 456 p.
- Green, H.
Industrial Rheology and Rheological Structures. New York, John Wiley & Sons, 1949, 311 p.
- Green, H. S.
The Molecular Theory of Liquids. Amsterdam, North-Holland Pub. Co., 1952, 264 p.
- Gross, B.
Mathematical Structure of the Theories of Viscoelasticity. Paris, Hermann et Cie., 1953, 74 p.
- Hatschek, E.
The Viscosity of Liquids. London, G. Bell & Sons, 1928, 234 p.
- Hermans, J. J. (Editor).
Flow Properties of Disperse Systems. Amsterdam. North-Holland Pub. Co., 1953, 445 p.
- Hill, R.
Mathematical Theory of Plasticity. Oxford, Clarendon Press, 1950, 366 p.
- Houwink, R. and Burgers, W. G.
Elasticity, Plasticity and the Structure of Matter. Cambridge, University Press, 2nd Edition, 1954, 368 p.

- Iliouchine, A. A.
Plasticité (Déformations élastico-plastiques), Paris, Editions Eyrolles, 1956, 376 p. (French translation from Russian).
- Jaeger, J. C.
Elasticity, Fracture and Flow (with Engineering and Geological Applications). London, Methuen & Co., 1956, 152 p.
- Kececiglu, D.
Bibliography on Plasticity. New York, American Society of Mechanical Engineers, 1950, 191 p.
- Kolsky, H.
Stress Waves in Solids. Oxford, Clarendon Press, 1953, 222 p.
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Hydrodynamics. Cambridge, University Press, 6th Edition, 1932, 754 p.
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The Mathematical Theory of Elasticity. Cambridge, University Press, 4th Edition, 1927, 644 p.
- Mason, W. P.
Physical Acoustics and the Properties of Solids. New York, Van Nostrand, 1958, 402 p.
- Mercier, A.
Leçons et Problèmes sur la Théorie des Corps Déformables. Paris, Gauthier-Villars, 1953, 156 p.
- Merrington, A. C.
Viscometry. London, E. Arnold & Co., 1949, 142 p.
- Milne-Thomson, L. M.
Theoretical Hydrodynamics. London, Macmillan & Co. Ltd., 1938, 551 p.
- Murnaghan, F. D.
Finite Deformations of an Elastic Solid. New York, John Wiley & Sons, 1951, 140 p.
- Nadai, A.
Theory of Flow and Fracture of Solids. New York, McGraw Hill, 1950, 567 p.
- Novozhilov, V. V.
Foundations of the Non-linear Theory of Elasticity. Rochester, N.Y., Graylock Press, 1953, 233 p.
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Theoretical Elasticity, London, Oxford University Press, 1959, 230 p.
- Persoz, P. (Editor).
Introduction à l'étude de la Rhéologie. Paris, Dunod, 1960, 251 p.
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Viscosität der Kolloide. Dresden, Theodore Steinkopff, 1942, 453 p. (Lithoprinted by Edwards Brothers, Ann Arbor, Michigan, 1944).

- Poiseuille, J. L. M. (Translated by Herschel, W. H.)
Experimental Investigations upon the Flow of Liquids in Tubes of very small Diameter. Rheological Memoirs, I. Lancaster, Pa., Lancaster Press, 1940, 112 p.
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An Introduction to Plasticity. London, Addison Wesley Pub. Co., 1959, 142 p.
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Theory of Perfectly Plastic Solids. New York, John Wiley & Sons, 1951, 264 p.
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Lectures on Theoretical Rheology. Amsterdam, N. Holland Pub. Co., 1960, 174 p.
- Reiner, M.
Deformation Strain and Flow—An elementary Introduction to Rheology. London, H. K. Lewis & Co., 2nd Edition, 1960, 347 p.
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The Dynamics of Real Fluids. London, E. Arnold & Co., 1949, 144 p.
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Relaxation Spectrometry. Amsterdam, North Holland Pub. Co., 1957, 140 p.
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Rheology of Suspensions. Amsterdam, H. J. Paris, 1939.
- Sneddon, I. N. and Hill, R. (Editors).
Progress in Solid Mechanics, Vol. I. Amsterdam, North Holland Pub. Co., 1960, 448 p.
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Mathematical Theory of Elasticity. New York, McGraw Hill, 1956, 476 p.
- Swainger, K.
Analysis of Deformation. London, Chapman & Hall, 1954-6.
Vol. I: Mathematical Theory, 300 p. *Vol. II: Experiment and Applied Theory*, 402 p. *Vol. III: Fluidity*, 308 p.
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- Westergaard, H. M.
Theory of Elasticity and Plasticity. London, Chapman & Hall, 1952, 176 p.
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Non-Newtonian Fluids. London, Pergamon Press, 1960, 136 p.
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Hardness and Hardness Measurements. Cleveland, Ohio, American Society for Metals, 1942, 546 p.

Particular Materials.

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High Polymers—Vol. VI. Mechanical Behaviour. London, Interscience Publishers, 1948, 581 p.

Barkas, W. W.

The Swelling of Wood under Stress. London, H.M.S.O., 1949, 108 p.

Baron, M.

The Mechanical Properties of Cheese and Butter. London, Dairy Industries Ltd., 1952, 106 p.

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Rheology in Relation to Pharmacy and Medicine. London, Pharmaceutical Press, 1948, 20 p.

Blair, G. W. Scott (Editor).

Foodstuffs, their Plasticity, Fluidity, and Consistency. Amsterdam, North Holland Pub. Co., 1953, 279 p.

Blair, G. W. Scott and Reiner, M.

Agricultural Rheology. London, Routledge & K. Paul, 1957, 234 p.

Finnie, I. and Heller, W. R.

Creep of Engineering Materials. New York, McGraw Hill, 1959, 352 p.

Freudenthal, A. M.

The Inelastic Behaviour of Engineering Materials and Structures. New York, J. Wiley & Sons, 1950, 587 p.

Frey-Wyssling, A. (Editor).

Deformation and Flow in Biological Systems. Amsterdam, North Holland Pub. Co., 1952, 562 p.

Frith, E. M. and Tuckett, R. F.

Linear Polymers. London, Longmans Green & Co., 1951, 355 p.

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Strength of Plastics and Glass. London, Cleaver-Hume Press, 1949, 262 p.

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Elastomers and Plastomers. Vol. I: General Theory. London, Elsevier Pub. Co., 1950, 495 p.

Leadermann, H.

Elastic and Creep Properties of Filamentous Materials and other High Polymers. Washington, D.C., The Textile Foundation, 1943, 278 p.

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Creep and Recovery. Cleveland, Ohio, American Society for Metals, 1957, 372 p.

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Mechanical Properties of Wood and Paper. Amsterdam, North Holland Pub. Co., 1953, 310 p.

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Mechanical Properties of Textile Fibres. Amsterdam, North Holland Pub. Co., 1956, 345 p.
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The Properties of Glass. New York, Reinhold Pub. Corp., 2nd Edition, 1954, 502 p.
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The Extrusion of Metals. London, Chapman & Hall, 1953, 205 p.
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Building Materials: Their Elasticity and Inelasticity. Amsterdam, North Holland Pub. Co., 1954, 576 p.
- Rotherham, L. A.
Creep of Metals. London, Institute of Physics, 1951, 80 p.
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A Practical Manual of Rubber Hardness Testing. London, Maclaren & Sons, 1951, 49 p.
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Creep of Metals and Alloys. London, Temple Press, 1949, 162 p.
- Stanworth, J. E.
Physical Properties of Glass. Oxford, Clarendon Press, 1950, 232 p.
- Stuart, H. A. (Editor).
Die Physik der Hochpolymeren. Berlin, Springer-Verlag, Vol. I, 1952, 609 p.; Vol. II, 1953, 783 p.; Vol III, 1955, 693 p.; Vol IV, 1956, 667 p.
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The Physics of Rubber Elasticity. Oxford, Clarendon Press, 2nd Edition, 1958, 351 p.
- Walton, W. H. (Editor).
Mechanical Properties of Non-metallic Brittle Materials. London, Butterworths Scientific Publications, 1958, 492 p.
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Elasticity and Anelasticity of Metals. Chicago, University of Chicago Press, 1948, 170 p.

Conference Reports.

Acad. Sci., U.S.S.R.

Conference of Viscosity of Liquids and Colloids. Proc. Acad. Sci., U.S.S.R., 1944, 3 vols.

British Rheologists' Club.

Essays in Rheology (Oxford Conference, 1944), London, Sir Isaac Pitman & Sons, 1947, 103 p.

British Rheologists' Club and Institute of Petroleum.

London Conference, 1945, *J. Inst. Petrol*, 1945, 31, pp. 239-338.

British Rheologists' Club.

The Principles of Rheological Measurement (London Conference, 1946), London, T. Nelson & Sons, 1949, 214 p.

British Rheologists' Club and Textile Institute.

Leeds Conference, 1948. *J. Text. Inst.* 1948, 39, No. 7, pp. 230-308.

British Rheologists' Club.

Some Recent Developments in Rheology (Bristol Conference, 1949). Edited by V. G. W. Harrison. London, United Trade Press, 1950, 147 p.

British Rheologists' Club and Institute of Physics.

Physics of Lubrication (Manchester Conference, 1950). *Brit. J. Appl. Phys.*, Supplement No. 1, 1951, 104 p.

British Society of Rheology.

The Rheology of Elastomers (Welwyn Garden City Conference, 1957). Edited by P. Mason and N. Wookey. London, Pergamon Press, 1958, 216 p.

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Rheology of Disperse Systems (Swansea Conference, 1957). Edited by C. C. Mill, London, Pergamon Press, 1959, 230 p.

Institute of Physics.

Measurement of Stress and Strain in Solids (Manchester Conference, 1946). London, Institute of Physics, 1948, 114 p.

International Union of Theoretical and Applied Mechanics.

Deformation and Flow of Solids (Colloquium, Madrid, 1955). Berlin, Springer-Verlag, 1956, 324 p.

Proceedings of the (First) International Congress on Rheology.

Scheveningen, 1948. Amsterdam, North Holland Pub. Co. 1949, 641 p.

Proceedings of the Second International Congress on Rheology.

Oxford, 1953. Edited by V. G. W. Harrison. London, Butterworths Scientific Publications, 1954, 451 p.

Proceedings of the Third International Congress on Rheology.

Bad Oeynhausen, 1958. *Rheologica Acta*, 1958, Vol. 1 (Incomplete)

Periodicals.

Rheology Abstracts.

Published for the British Society of Rheology by Pergamon Press, London. Quarterly from 1958.

Rheologica Acta.

Published by Dr. Dietrich Steinkopff Verlag, Darmstadt, Germany. First issue 1958.

Transactions of the (U.S.) Society of Rheology.

Published by Interscience Publishers, New York. Annually from 1957.

finished. Thus, understandably, the path from lecture theatre to canteen resembled a cross-country course. But the problems it posed were much less severe than those presented by the lighting equipment in the lecture theatre. Even our local representative hasn't mastered the latter after many years of residence.

The new president, Professor R. W. Douglas, and Mrs. Douglas, were present at the Conference Dinner in Neuadd Gilbertson. Professor Douglas, who is a relative newcomer to the Society, introduced himself to members in a brief after-dinner speech. The fact that it was delivered to an audience half seated and half clustered round the dining room door only emphasises the informal nature of the Society's dinners and implied no disrespect to our new President.

The list of papers presented at the 31st Annual Meeting of the U.S. Society of Rheology on 31st October to 2nd November, 1960, is as follows:—

- "The normal forces and their thermodynamic significance," H. Hull.
- "A direct method for measuring the normal stress in simple shearing flow," A. B. Metzner, W. H. Houghton, and R. A. Sailor.
- "Experimental tests of symmetry conditions in laminar flow," W. Philippoff.
- "Flow birefringence of molten polyethylene," F. D. Dexter, J. C. Miller, and W. Philippoff.
- "Molecular weight—temperature—concentration relationships for the viscosity of polyvinyl acetate and its solutions in diethyl phthalate and in cetyl alcohol," H. Nakayasu and T. G. Fox.
- "The rheology of polyelectrolytes. I. Flow properties of carboxy-polymethylene-water systems," J. G. Brodnyan and E. L. Kelley.
- "Upper Newtonian regime in polymer solutions," E. W. Merrill.
- "An equation for non-Newtonian flow," A. M. Mattocks.
- "Application of the method of composition and linear regression analysis to a problem involving a pseudoplastic suspension," W. F. Ames and V. C. Behn.
- "Flow properties of attapulgite suspension in water," A. F. Gabrysh, T. Ree, H. Eyring, and I. Cutler.
- "The differentiation method in rheology," J. G. Savins, G. C. Wallick, and W. R. Foster.
- "Rheological properties of blood," R. H. Haynes.
- "Shear viscosities and stress-relaxation viscosity parameters of gelled oils," D. W. Criddle and J. Cortes, Jr.

- "Frequency and temperature dependence of dynamic mechanical properties of a high-density polyethylene," H. Nakayasu, H. Markovitz, and D. J. Plazek.
- "Dynamic mechanical properties and creep of poly-2-ethyl butyl methacrylate," T. P. Yin and J. D. Ferry.
- "Bulk creep and recovery in free volume dependent viscosity," A. J. Kovacs.
- "A theory for the occurrence of intrinsic resonances in stressed solid materials," S. R. Bodner.
- "The distribution of pressures in the roll application of Newtonian fluids," R. R. Myers and R. D. Hoffman.
- "Capillary rheometry as a technique for predicting processing of elastomers," C. C. McCable and N. N. Mueller.
- "Effect of die entry geometry on polymer smelt fracture and extrudate distortion," E. B. Bagley and H. P. Schreiber.
- "Some elastic effects in polymer flow," E. B. Bagley.
- "Flow and shape of drops in non-Newtonian fluids," A. Fararoui and R. C. Kintner.
- "Variational principles for non-Newtonian flow," M. W. Johnson.
- "Applications of variational principles in rheology," M. W. Johnson, A. J. Ziegenhagen, and R. B. Bird.
- "Conservation laws for liquid crystals," J. L. Ericksen.
- "On constitutive relations for materials with memory," B. Bernstein.
- "On the foundation of linear viscoelasticity," B. D. Coleman and W. Noll.

At a meeting of the Netherlands Society of Rheology on 25th November, 1960, papers were presented on the rheological properties of food-stuffs. They were:

- "Rheological tests on cheese," by Dr. C. W. Raadsveld (Ned. Inst. voor Zuivelonderzoek, Ede).
- "Consistency of custard and porridge," by Ir. R. Rutgers (N.V. Kon. Pellarij "Mercurius," Wormerveer).
- "The rheology and chemistry of dough," by Dr. A. H. Bloksma (Inst. voor Graan, Meel en Brood, T.N.O., Wageningen).

Future Meetings.

The Spring Meeting of the British Society of Rheology will be held at Reading on 20th-21st April, 1961. The subject is "*Theoretical Rheology*." It is intended to have papers by people who normally give papers to mathematical societies, giving the physical implications of their work. The Honorary Secretary will be pleased to hear from one or two more

contributors to complete the programme. Accommodation will be available at St. Patrick's Hall and the meetings will take place at the National Institute for Research in Dairying.

The Autumn Meeting, "*Rheological Techniques*," will be held jointly with the Non-destructive Testing Group of The Institute of Physics and The Physical Society. It will probably be held in Llandudno in September. Dr. P. Lord, Secretary of the Group, is organiser. Members are invited to submit a short paper devoted to a particular technique. The papers will be published in "Laboratory Practice" and should not exceed 2,000 words. Intending contributors should write to the Honorary Secretary.

The Institute of Physics and The Physical Society has arranged a conference on "*Physics of Polymers*" at Bristol University from 10th–12th January, 1961. Principal topics are: Statistics of chain configurations, Molecular motions in polymers, Fibre structure and crystallinity in polymers and Irradiation effects. It is hoped that Prof. H. Mark will give an introductory lecture and Sir Gordon Sutherland an evening lecture on "*Infra-red spectroscopy of polymers*." Information is available from the Secretary of the Institute and Society, 47 Belgrave Square, London, S.W.1.

The Annual Exhibition of the Institute of Physics and The Physical Society will be held from 16th–20th January, 1961, at the Royal Horticultural Society's Halls, Westminster.

Meetings of the Institution of Chemical Engineers include:

Mass transfer in drops and bubbles, by Prof. F. H. Garner, on 24th January, 1961, at 5.30 p.m., at Burlington House, W.1.

Papers on *Fluidization*, by the staff of A.E.R.E. Harwell on 7th March, 1961, at 4.0 p.m., at Burlington House, W.1.

Papers on *Metals and Non-metals as materials of construction*: A Symposium at the Chemical Engineering Dept., University of Birmingham, on 12th April, 1961, at 9.30 a.m., to 5.30 p.m.

A symposium on *Biochemical engineering* at the Royal Commonwealth Society, Northumberland Avenue, W.C.2, on 30th May, 1961.

A three-day meeting on *Interaction between fluids and particles*. This will take place during the Third Congress of the European Federation of Chemical Engineering to be held in London on 20th–26th June, 1962. Intending contributors to this meeting should contact the General Secretary of the Institution at 16 Belgrave Square, London, S.W.1, as soon as possible and not later than 30th April, 1961.

Accounts for the Year Ending 30th June, 1960

1958-9

£		<i>Income</i>			£	s.	d.
648	Balance on 1st July	..	..	..	681	10	2
262	Subscriptions, members	..	..	..	280	13	4
2	subscribers	..	..	..			—
12	Interest P.O.S.B. A/c.	..	..	..	12	1	0
10	From advertising vacant appointments	..	..	..			—
—	Casual sales of Bulletins	..	..	..	5	0	0
—	Surrender of cheques	..	..	..	2	2	
£934					£979 6 8		

1958-9

£		<i>Expenditure</i>			£	s.	d.
195	Printing and Distribution of Bulletin and Abstracts				98	4	8
52	Committee and administrative expenses	..	..	..	122	6	5
6	Subsidy of meetings	..	..	..	77	14	4
681	Balance on 30th June	..	..	..	681	1	3
£934					£979 6 8		

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DR. G. H. TATTERSALL,
32, High Storrs Drive,
SHEFFIELD, 11.

MR. R. W. WHORLOW,
Physics Department,
Battersea College of Technology,
Battersea Park Road,
LONDON, S.W.11.

Co-opted member of
Committee:

MR. P. E. KNAPP,
20, Wayside Avenue,
Harrogate,
Yorks.

Fletcher & Co.
Printers, 39 Osborne Road
Farnborough, Hants.