

THE BRITISH SOCIETY OF RHEOLOGY

BULLETIN



1985, VOL, 28 No. 2

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PORT SUNLIGHT LABORATORY
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ISSN-0045 3145

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Editorial

In this issue Prof. Astarita provides a solution for the leaking bucket problem. Can it really be that simple? Is there not a more complicated solution? Keep reading your Bulletin for developments!

Full details are now available for the autumn Conference and A.G.M. "New techniques" seems to have collected together quite an interesting collection of papers.

Another "new" area for most of us is computer modelling of liquids, polymer solutions and dispersions. It is now possible to perform computer experiments on quite realistic "fluids".

Two meetings are advertised in this area and I think we'll see this as a growth area in rheology.

In general the use of computers in rheology is growing steadily, and perhaps in the near future the Society's Annual Conference will be on this subject.

Howard Barnes.

Conference "New Techniques in Experimental Rheology"
University of Reading, Whiteknights, Reading, Berkshire
9-11 September, 1985

Provisional Programme

Monday, 9 September

10.00-12.00	Registration
13.00-13.30	LUNCH
<u>First Session</u>	<u>New Instrument and Data Processing Developments.</u>
14.00-14.40	Infinite stiff torque and normal force transducer for rotational viscometers. A Frank, Rheometrics gmbh, Frankfurt, W.Germany.
14.40-15.20	Microprocessor controlled dynamic rheometer. A E Bell, S L James and C Marriott, Department of Pharmacy, Brighton Polytechnic.
15.20-15.40	TEA
15.40-16.20	Multistress studies with a computer controlled stress rheometer - full instrument control, data collection and analysis by microcomputer. L Coucoulas and R A Dawe, Department of Mineral Resources Engineering, Imperial College, London.
16.20-17.00	Title to be announced. T E R Jones, Plymouth Polytechnic.
17.00	Close of session.
18.30-19.30	DINNER

Tuesday, 10 September

07.45-08.30

BREAKFAST

Second Session

New Techniques and Methods for Materials with
Complex Rheology.

09.00-09.40

Flow visualisation using video cameras.

V Bodalia, T H Hammond, D G Knight and R W Williams,
Department of Chemical Engineering, Polytechnic of
Wales, Pontypridd.

09.40-10.20

Viscosity measurements on gas/oil solutions under
high pressure with a newly developed spring-
bellows capillary viscometer.

H Killesreitor, Institute for Erdolforschung,
Claustal-Zellerfeld, W.Germany.

10.20-10.40

COFFEE

10.40-11.20

Equipment for measuring the shear modulus of
weakly structured suspensions.

D J Hannant and J Keating, Construction Materials
Research Group, University of Surrey, Guildford.

11.20-12.00

Yield stress - a time dependent property and how
to measure it.

D C H Cheng, Materials Handling Division, Warren
Spring Laboratories, Stevenage.

13.00-13.30

LUNCH

Second Session (Cont'd..)

14.00-14.40

Emulsion rheology at low to medium shear stress
(5-16,000 dynes cm^{-2}).

L Coucoulas and R A Dawe, Department of Mineral
Resources Engineering, Imperial College, London.

14.40-15.20

Developments in the vane test to measure the gel
strength of thixotropic oil-well cements.

A Haimondi and D J Hannant, Construction Materials
Research Group, University of Surrey, Guildford.

15.20-15.40

TEA

Tuesday, 10 September

Second Session (Cont'd..)

- 15.40-16.20 Load bearing and friction characteristics of polymer-thickened lubricants between rotating cylinders.
D R Oliver, Department Chemical Engineering, University of Birmingham.
- 16.20-17.00 Thermorheological analysis of polymers.
S T E Aldhouse, R & D Department, B.P. Chemicals, Grangemouth.
- 17.30-18.30 British Society of Rheology Annual General Meeting.
- 20.00 CONFERENCE DINNER

Wednesday, 11 September

- 07.40-08.30 BREAKFAST
- Third Session Techniques for Slurries.
- 09.00-09.40 A parametric study on the rheological characteristics of waste water sludges.
K T Ewida, Fac. of Engineering, Zagazig University, Egypt.
- 09.40-10.20 A new method for the evaluation of settling of slurries in rheological measurements.
J Kramarz and K Porzycka-Semczuk, Institute of Chemistry, Cracow Polytechnic, Poland.
- 10.20-10.40 COFFEE
- 10.40-11.20 Title and Author to be announced.
- 11.20-12.00 Title and Author to be announced.
- 12.00-12.15 Close of Conference.
- 13.00-13.30 LUNCH

Second Conference of European Rheologists

The Conference will be held at Prague, Czechoslovakia, June 17-20, 1986. The Conference is organized by the Group of Rheology of the Czechoslovak Chemical Society, Institute of Hydrodynamics, Czechoslovak Academy of Sciences.

Scope of the Conference

The Conference will be concerned with the results in the following subject areas: Theory, Transport phenomena in rheological systems, Rheometry, Solids and composites, Rubber, Suspensions, Polymers, Polymer processing, Biorheology and medical applications, Food rheology and processing, Triboology, General.

International Scientific Advisory Board

The following distinguished rheologists have agreed to participate and to act as members of the International Scientific Advisory Board (in alphabetical order): J.V. Alemán (Spain), G. Astarita (Italy), H.C. Booij (The Netherlands), J.M. Dealy (Canada), H. Giesekus (F.R.G.), C. Huet (France), Ya. Ivanov (Bulgaria), K. Kirschke (W. Berlin), J. Kubát (Sweden), J.L. Leblanc (Belgium), A.Y. Malkin (U.S.S.R.), B. Mená (Mexico), A.B. Metzner (U.S.A.), S. Onogi (Japan), C.J.S. Petrie (G.B.), E.O. Reher (G.D.R.), W.R. Schowalter (U.S.A.), J. Schurz (Austria), J.F. Stoltz (France), R.I. Tanner (Australia), K. Walters (G.B.), Y.G. Yanovsky (U.S.S.R.), A. Ziabicki (Poland).

Submission of Papers

Authors should send title and short summary (about 30 words) of proposed papers to the Conference Committee as soon as possible (final date June 30, 1985). A registration form is available on request.

Language

The official Conference language is English.

1st Circular on Request

Those wishing to receive the First Circular of the Conference are kindly requested to write to the address below.

Address for Correspondence: 2nd EURO-RHEO Conference, Institute of Hydrodynamics, Czechoslovak Academy of Sciences, Podbabská 13, 166 12 Prague, Czechoslovakia.

International Conference on Viscoelasticity of Polymeric Liquids: Theory—Experiment—Applications

The Conference will be held at Grenoble (France) on January 13–16, 1986. The Conference is organized by Prof. J.M. Piau, (Institut de Mécanique de Grenoble) and Prof. P.J. Carreau (Ecole Polytechnique de Montréal), under the expected sponsorship of CNRS, GFR, USMG and INPG.

Scientific Committee

J.F. Agassant, CEMEF Ecole des Mines de Paris, France;
J.P. Cohen-Addad, Université de Grenoble, France;
G. Marrucci, Istituto di Principi di Ingegneria Chimica, Napoli, Italia;
J.M. Pierrard, Institut de Mécanique de Grenoble, France;
K. Walters, University College of Wales, Aberystwyth, G.B.

Objectives

To allow specialists using theoretical, numerical and experimental techniques in the complementary fields of Physics, Mechanics, Chemical Engineering, Applied Mathematics, Industrial Development, to meet and inform the scientific community of recent progress and future prospects in these fields.

Conference Topics

Polymer solutions and melts, ionic, filled, reacting polymers, etc. will be considered. The meeting will cover the following areas: Polymer processing; Chemical engineering processes; Rheometry—new rheological techniques and results; Physical theories and experimental results on flowing media; Constitutive equations (phenomenological, structural, thermodynamic); Numerical techniques, numerical models and problems (including free surface flows, phase change problems).

Technical Program

The programme will include about 8 invited lectures, 30 contributed papers and 4 general discussion sessions, and possibly a poster session. The proceedings of the Conference will be published as a regular issue of the Journal of Non-Newtonian Fluid Mechanics.

Deadline for preregistration and abstracts: June 30th, 1985

For Preregistration forms and details, please contact the organizers or write to: International Conference on Viscoelasticity, Institut de Mécanique de Grenoble, B.P. No 68 — Domaine Universitaire, 38402 Saint Martin d'Heres Cedex, Attn. J.M. Piau.

"STOCHASTIC DYNAMICS AND MACROMOLECULES"

CCP5 (Computational Collaborative Project number 5) is a SERC sponsored organisation responsible for promoting collaborative research and meetings in the area of the microscopic modelling of condensed matter. The main techniques used are Molecular Dynamics (MD), Monte Carlo (MC) and Static Lattice (SL) simulations. In MD large numbers (e.g. many thousands) of model molecules are allowed to interact via intermolecular potentials. This leads to a series of co-ordinates of the molecules in time and space which can yield thermodynamic and transport behaviour. In recent years a new development of MD, so-called Non-Equilibrium Molecular Dynamics (NEMD) has allowed us to observe the response of these systems to external changes of shear strain, compression and extension. Valuable truly microscopic insights into the origins of linear and non-linear rheological properties of materials has resulted.¹⁻²

CCP5 is organising a meeting at the University of York (Sept. 11 - Sept. 13, 1985) on "STOCHASTIC DYNAMICS AND MACROMOLECULES". This will be concerned with techniques and results relating to the simulation of large molecules (e.g. polymers and proteins) and other systems in which there is a wide spread of relaxation times (e.g. colloids). No doubt material properties will be discussed. The invited speakers are: H J C Berendsen or W Van Gunsteren (Groningen, The Netherlands), who will talk on "Stochastic Dynamics of Proteins"; G Bossis (Nice, France) who will talk on "Colloids" and C L Brooks (Harvard, USA) who will talk on "Stochastic Boundary Methods". If you would like to contribute to the meeting or like just to attend, then please write to:

Dr Eric Dickinson
Procter Department of Food Science
University of Leeds
Leeds LS2 9JT

1. L V Woodcock, Chem. Phys. Lett. 111 (1984) 455
2. D J Evans and G P Morriss, Phys. Rev. A 30 (1984) 1528.

ADVANCE NOTIFICATION:

The BRITISH SOCIETY of RHEOLOGY
will be holding a workshop entitled:
"MOLECULAR APPROACHES TO RHEOLOGY"

at

Royal Holloway and Bedford College

(Pleasantly situated in the heart of the Surrey countryside!)

early in 1986

Recent advances have been made in the theoretical and computer modelling of rheology starting from behaviour at the molecular level. For example, it is now possible to follow the motions of model molecules within liquids under shear flow using the new technique of Non-Equilibrium Molecular Dynamics (NEMD), enabling us to discover the microscopic origins of non-newtonian flow.

In response the BSR is sponsoring a workshop aimed to bring together scientists interested in rheology from a variety of backgrounds to discuss their rheological work in the context of its microscopic origins. Expertise in these new modelling techniques will be present. Participants, numbering between 20-25, will take part in a loosely structured 'round-table' discussion designed to promote the informal interchange of ideas. To assist this task it is suggested that attendees come along with short presentations (say, of 10-15 minutes duration) outlining their interest and problems in this area, and which can be called upon at opportune moments!

The one and a half day meeting will be inexpensive (in the region of £20-£30). There will be no registration fee. If you are interested in attending, please write to:

Dr D M Heyes
Department of Chemistry
Royal Holloway and Bedford College
Egham
Surrey TW20 OEX, U.K.

It would be most appreciated if you could outline your interests in this area and what you hope to get out of the meeting.

SCIENTISTS FROM ALL AREAS OF RHEOLOGY ARE WELCOME IRRESPECTIVE OF THEIR KNOWLEDGE OF MODELLING. A DESIRE TO UNDERSTAND AND EXPLAIN THEIR AREA OF RESEARCH IN TERMS OF WHAT THE MOLECULES ARE DOING IS THE MAIN REQUIREMENT!

SECOND EUROPEAN CONFERENCE ON COAL LIQUID MIXTURES

16th-18th September 1985

London

Conference includes papers on:

"Use of Surfactants and Polymers for Preparation and Stabilization of Coal Suspensions", Th F. Tadros, ICI

"Polyacrylate Thickeners for Coal Water Slurries: Slurry Formulation, Stability and Rheology", J. Natoli & R.C. Mahar, Rohm & Haas, USA

"Slurry Preparation of Lignite by Particle Structure Degrading", J.D. Burnett Jr, Ergon, USA

"Liquid Coal — A New Coal Slurry Fuel without Water", R.A. Wolfe, United Coal Research, USA

"Fine Coal Feedstocks for Coal-Water Mixture Preparation from UK Coals", R.A. Boeuf, P.H. Connolly, G. Fynnes, S.R. Shaw & F. Vickers, NCB

"Rheology of Coal-Water Fuel", E.T. McHale & H.L. Heaton, Atlantic Research, USA

"Pipeline Conveyance and Fluidised Bed Combustion of CWM", C. Kefa, H. Guoquang & N. Mingjiang, Zheijiang University, China

"Atomisation of Coal Water Mixtures", J.W. Allen, A.G. Rennie & M.C. Welbourne, NEI International Combustion

FEES

The fees cover attendance at all sessions of the Symposium, preprints, lunch and interval refreshments, and tickets to the Welcoming Reception.

£224.25 (inc. £29.25 VAT) for members of IChemE/EFCE Member Societies/Institute of Energy

£270.25 (inc. £35.25 VAT) for Non-Members

FURTHER INFORMATION

All correspondence and enquiries in connection with the conference should be addressed to:

The Conference Section
The Institution of Chemical Engineers
165-171 Railway Terrace
Rugby, Warwickshire
CV21 3HQ

Telephone: (0788) 78214 Telex: 311780

Attention: Miss Julie Wearne or Miss Anne Hughes

CALL FOR PAPERS

FOOD RHEOLOGY CONFERENCE

The British Society of Rheology, with the kind co-operation of the Food Research Institute, Norwich, proposes to hold a Conference on "Food Rheology" at Norwich from 15th - 18th April, 1985.

Papers are invited from all those who are concerned with the measurement and application of solid, paste, and liquid food materials. Please send abstracts, no longer than 200 words, to Dr G J Brownsey, Food Research Institute, Colney Lane, Norwich NR4 7UA, England. Abstracts should arrive before September 1985.

Registration forms will be available from the same address.

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THE LEAKING BUCKET PROBLEM

Gianni Astarita
Chemical Engineering Department
University of Naples, Italy

Let R_A and R_B be the readings of the two weighing devices. Let W_A and W_B and W_C be the weights of the material in bucket A, in bucket B and in the column connecting them. Let F_A and F_B be the tensile stress integrated over the column's cross section at the top and bottom, respectively. Then obviously:

$$1. \quad R_A = W_A + F_A$$

$$2. \quad R_B = W_B - F_B$$

A force balance on the column, neglecting acceleration and air drag is:

$$3. \quad F_A - F_B = W_C$$

Combination of Equations 1, 2 and 3 yields:

$$4. \quad R_A + R_B = W_A + W_B + W_C = 100 \text{ units}$$

which is the required result.

NOTICE OF THE ANNUAL GENERAL MEETING 1985

The 45th Annual General Meeting of the British Society of Rheology will be held on Tuesday 10th September, at the University of Reading, commencing at 5.30 pm.

Members are reminded that (Rule 7(b)) the business of the meeting includes:

- (i) The election of officers and other members of Council.
- (ii) The receipt of a report and audited accounts from Council.
- (iii) Appointment of auditors and fixing of their remuneration (Rule 6).
- (iv) Dealing with matters raised by Council or by any member, and receiving suggestions from members for consideration by Council.

The President, Professor I M Ward, holds office until 1986. Nominations for Council or for any office (other than that of President) should be sent to the Secretary (or may be made at the Annual General Meeting in accordance with Rule 5(b)).

The Secretary would be pleased to receive notice of any matters that any member wishes to raise.

1984 Royal Society of Chemistry Awards

Hearty congratulations to Dr Howard Barnes, our Bulletin Editor, who recently received an RSC award. This was given for his distinguished work on the interaction of particles in solution and the rheological properties of dispersed solids in liquids, with special reference to the products of the detergent industry.

J J Benbow

MEMBERSHIP NEWS

The following applications for Membership were approved at the Council Meeting on March 22nd 1985.

Mr Martyn Christopher DAVIES, Department of Pharmacy, University of Manchester, Manchester M13 9PL	B.Sc, M.P.S. petsa DEFGH
Dr Thomas GEEHAN Slumberger Forex Neptune, 50 Avenue Jean-Jaures, 92542 Mountrouge Cedex, P.O. Box 599, FRANCE	B.Sc, Ph.D fa FG
Mr David HOLME British Ceramic Research Ass. Ltd., Queens Road, Penkhull, Stoke-on-Trent, Staffs	B.Eng Hons pea DGHJ
Mr Iain Paul Tiernay MOORE Dept of Chemical Engineering, The University of Birmingham, Edgbaston, Birmingham, B15 2TT	BA (Chem Eng) feta DEFG
Mr Ronald SHARPE Nalfloc Ltd., P.O. Box 11, Northwich, Cheshire, CW8 4DX	Grad.R.S.C. pea DFGJ
Dr Jeffrey SOLOMON PA Technology, Melbourn, Royston, Herts, SG9 6DP	B.Sc (Eng) Hons, Ph.D peta DFGHLM
Dr John William SPICER Research Department, Miles Laboratories Ltd., Stoke Court, Stoke Poges, Slough, SL2 4LY	B.Sc, Ph.D fes M

Mr Paul Anthony WILKINSON
Applied Research Department,
Pedigree Petfoods,
Melton Mowbray,
Leicestershire

GRSC, M.Sc

feta GL

Mr Zhenmiao XU
Fibre & Textile Research Unit,
University of Strathclyde,
Glasgow

Graduate, Qing Hua University,
China
feta D

RESIGNATIONS

Dr R. Crawford, The Queen's University of Belfast. Joined in 1976.

Dr E.M.Dearden, Benoni, South Africa. Joined in 1969.

Mr A.J. Gillham, Middlesbrough, Cleveland. Joined in 1962.

Mr H.Harborg, Dumex Ltd., Copenhagen, Denmark. Joined in 1980.

Mr M.J. King, Liverpool Polytechnic. Joined in 1967.

Dr Pamela Meadows, Maidstone, Kent. Joined in 1972.

Prof. G. Pezzin, Centro di Studio per la Fisica Delle Macromolecole,
Bologna, Italy. Joined in 1961.

DEATHS

We regret to announce having received notification of the deaths of
the following members.

Dr B. Yates, Unilever Research, Port Sunlight. He joined the Society in
1968.

Mr R.R Zangger Contraves AG, Zurich, Switzerland. He joined the
Society in 1964.

MEMBERS MOVED ABROAD

Dr K.Clare, Kelco AIL International Ltd., Tadworth, Surrey has been transferred to the firm's San Diego office.

Dr D.E.Marshall, Institute of Polymer Technology, Loughborough has moved to B.F.Goodrich Co., Avon Lake, Ohio, U.S.A.

Dr P. Prentice has moved from Imperial College, London to the Institut Algerien du Petrole, Annaba, Algeria.

Dr T.A.Samad, UCW, Swansea has returned to the University of Basrah, Iraq.

MEMBERSHIPS FOR DELETION UNDER RULE 4D.

The membership of the following members has been terminated under rule 4d for arrears of subscriptions.

Mr N.J Alderman University of Cambridge. Joined in 1982.

Dr A Buckley Celanese Research Co., New Jersey, USA. Joined in 1983.

Mr C.J Camilleri University of Malta. Joined in 1964.

Mr H Court Was at UCW, Aberystwyth. Joined in 1976.

Mr N.W Crane Thames Ditton, Surrey. Joined in 1982.

Mr G.D Hubbard Dunlop Research, Birmingham. Joined in 1972.

Mr G.D Richards Brandon University, Manitoba, Canada. Joined in 1980.

Mr R Saynor Northern General Hospital, Sheffield. Joined in 1982.

Mr B.J.J Webster Standardised Food Products, Runcorn. Joined in 1983.

Mr G.D Wills Pedigree Petfoods, Melton Mowbray. Joined in 1981.

Mr M.H Yates Was at Laporte Industries, Widnes. Joined in 1964.

Dr M.A Younes Abu Dhabi National Oil Co., U.A.E. Joined in 1970.

VISCOMETER TRAINING COURSE

The Viscometer Department of Contraves Industrial Products Limited of Ruislip, Middlesex, are to hold their third Viscometry Training Course this year on 2/3 October.

Delegates on this course will be introduced to the basic principles of viscometry and manual techniques through lectures and workshop sessions providing 'hands on' experience and demonstrations. During these practical sessions the full range of Contraves rotational viscometers will be made available for use by delegates.

Lectures will deal with the definition of viscosity and the relationships which exist in both Newtonian and non-Newtonian (time independent and time dependent) flow. Special attention will be given to the principles which are involved in both coaxial cylinder and cone-and-plate geometries. Comprehensive notes will be provided.

Practical sessions will involve demonstrations of different flow properties and measurements of different materials by the delegates. Delegates may bring samples for testing during the evening session. Contraves staff will be in attendance at the hotel for informal consultancies.

The two-day course fee of £140 (+VAT) is inclusive of accommodation, meals and documentation.

To allow for close individual training and supervision, the course will be restricted to twelve delegates.

Further information and registration forms are available from Mrs C A Moules, Contraves Industrial Products Limited, Times House, Station Approach, Ruislip, Middlesex, HA4 8LH. Telephone: 08956 30196. Telex: 935129.

Process Control Viscometers: Current Applications and Future Needs

by D C-H Cheng, J A Hunt and P Madhvi

Published by Warren Spring Laboratory
Stevenage, Herts, SG1 2BX, UK.
Pp. ca. 360, 35 tables, 71 figures; 1985

SUMMARY

This report surveys the current availability and usage of commercial and homemade process viscometers and rheometers, describes the modern approach to process control using microprocessors and attempts to establish guidelines for the choice of process instrumentation and the setting up of viscosity process control systems. The reasons why process control viscometer application is not widely practised are discussed leading to the identification of future research needs to promote the use of process control viscometers in industry.

Some 20 viscometer manufacturers were surveyed, covering some 45 models each with numerous variants. The manufacturers' literature was supplemented by postal questionnaire and visits to selected manufacturers and agents, and to users. The data are compiled into tables covering measurement techniques, viscosity ranges, pressure and temperature ranges, materials of construction, electrical and pneumatic supply requirement, form of display, output and control output, intrinsic safety classification, application areas, costs, etc.

Homemade viscometers described in the literature were surveyed and visits made to companies that have designed and use such instruments.

Some 180 papers and reports in *the scientific and technical literature were surveyed*. They are classified into 13 broad subject headings, each of which is further subdivided, to make retrieval of specific topics a simple matter. The papers relating to three topics were reviewed: namely, requirements of a process control viscometer, reasons and methods for on-line measurement of viscoelastic properties and on-line measurement of paste properties.

In **considering modern approaches to process control**, the following are discussed: components of a modern control system, types of control, commercial control systems available, and general benefits of microprocessor control. A glossary of computing terms, categorisation of commercial control systems and suppliers are included.

Process viscosity measurement and viscosity process control, conventional and with micro-processor application, are surveyed. The use of microprocessors to control process instruments is discussed. Current process control practice as well as potentials for microprocessor control are covered. The industrial areas considered are: fuel oil viscosity control, polymer processing, bitumen blending, oil blending, grinding mill media control, ink viscosity control, polymerisation reaction, chocolate blending, paint viscosity control and starch cooking. A **survey of potential users of commercial viscometers** was carried out. Their needs in viscometers and process control were collated. The industries are pharmaceuticals, oil, coating fluids, food, paint, ordnance, building materials, tableware and adhesives.

In the **general discussion**, topics considered are: comparison of commercial versus homemade viscometers, the lack of paste instruments, rheometers for viscoelasticity and thixotropy, why process control viscometers are not widely used and alternatives to viscosity measurement. The latter include density, solids content, particle size and distribution, molecular weight and distribution, chemical composition and mixture properties. The calculation and calibration for viscosity and of shear rate for non-Newtonian fluids are given.

For **recommended procedures**, a list of do's and don'ts is drawn up, covering the selection of viscometers and their use. Guidelines are given for the planning of a viscosity process control system and a microprocessor control project: initial appraisal, systems design, instrument and microprocessor specification, systems selection, taking delivery and commissioning, and staffing of the planning work. Guidelines are also given for putting the case before management.

The report concludes with a **list of research requirements**, pointing out gaps in this survey, in the availability of commercial viscometers and rheometers, in performance data and the need for a case study of the setting up of a viscosity process control system in order to firm up the guidelines for the design and implementation of such a system. Specific future work is detailed.

To obtain your own copy of the report, contact:

Miss P Madhvi

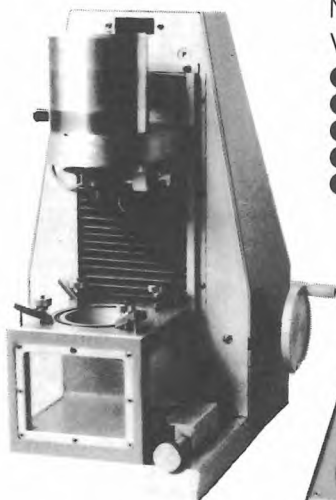
Warren Spring Laboratory
Gunnels Wood Road
Stevenage, Herts
SG1 2BX
United Kingdom
Telephone: Stevenage (0438) 313388
Telex: 82250

MATERIALS TESTING FROM SANGAMO RHEOLOGY

A comprehensive range of sophisticated rheology equipment for the measurement of shear, yield, thixotropic and the visco-elastic properties of Polymer Melts, Suspensions, and most Newtonian or non-Newtonian fluids.

Visco-elastic Analyser offers:

- Yield stress evaluation
- Creep growth and relaxation
- Oscillatory mode tests
- Temperature to 300°C
- With IEEE Interface and Software



Visco-elastic Analyser
Constant Stress Tester



Other Rheology products from Sangamo include:

- New Series II R20 Weissenberg now available
- Elongational Viscometer
- Rheovibron Solids Tester

Computer Controlled versions of the above available.

SANGAMO
Schlumberger

Sangamo Transducers (Rheology Division)
Steyning Way, Southern Cross Trading Estate
Bognor Regis, West Sussex PO22 9ST
Telephone 0243 825011 Telex 86827