

29 MAY 1990

THE BRITISH SOCIETY OF RHEOLOGY

BULLETIN



1990, Vol. 33 No. 1

Contents

Officers and Members of Council	i
Editorial	ii
Scott-Blair Scholarship	1
Estoril meeting	2
The Guth-Gold formula	4
Membership News	5
The Golden Jubilee Meeting	7
Conference Diary	24
Other conference news	26
Advertisements	

Hon. Editor
Professor P. Townsend,
Department of Mathematics
and Computer Science,
University College,
SWANSEA, SA2 8PP.



ISSN-0045-3145

THE BRITISH SOCIETY OF RHEOLOGY
OFFICERS AND MEMBERS OF COUNCIL
1989/90

- President:** Dr J Ferguson, University of Strathclyde,
Department of Pure and Applied Chemistry,
Thomas Graham Building, 295, Cathedral Street,
Glasgow G1 1XL.
Tel: 041-552-4400 Fax: 041-552-4775 Telex: 77472
- Secretary:** Mr R E Carter, Carter Baker Enterprises Ltd.,
2, Marshbrook Business Park, Marshbrook, Church Stretton,
Shropshire SY6 6QE
Tel. 06946-466/7 Fax: 06946-468
Telex: 9312102287 CB G Email: Gold 72: MAG31999
- Treasurer:** Mr P C Anderson, Production Operations,
BP Research Centre, Chertsey Road,
Sunbury-on-Thames, Middlesex TW16 7LN
Tel: 09327-63351 Fax: 09327-62999 Telex: 296041
- Membership Secretary:** Mr H Schimanski, Carri-Med Ltd.,
Glebelands Centre, Vincent Lane,
Dorking, Surrey RH4 3YX
Tel: 0306-886180 Fax: 0306-885009 Telex: 859115 CARIN G
- Abstracts Editor:** Dr G J Brownsey, AFRC Institute of Food Research,
Norwich Laboratory, Colney Lane, Norwich, NR4 7UA
Tel: 0603-56122 Telex: 975453 FRINOR G
- Bulletin Editor:** Prof P. Townsend, Department of Maths and Computer Science,
University College, Singleton Park,
Swansea SA2 8PP
Tel: 0792-295398 Fax: 0792-295532 Telex: 48358 UL SWAN G
- Ordinary Members:** Mr S T E Aldhouse, BP Chemicals Ltd.,
Research and Development Department, PO Box 21,
Bo'ness Road, Grangemouth, Stirlingshire FK3 9XH
Tel: 0324-493466 Fax: 0324-471697 Telex: 777513
- Dr P F G Banfill, School of Architecture and Building Engineering,
University of Liverpool, PO Box 147, Liverpool L69 3BX.
Tel: 051-794-2619 Fax: 051-708-6502 Telex: 627095
- Dr R Buscall, Imperial Chemical Industries PLC,
Corporate Colloid Science Group, PO Box 11,
The Heath, Runcorn, Cheshire WA7 4QE.
Tel: 0928-513632 Fax: 0928-576675 Telex: 629655 ICIMOH G
- Dr A Evans, The Compression Chamber,
Royal Victoria Infirmary, Newcastle-upon-Tyne NE1 4LP
Tel: 091-281-2081
- Dr D J Hourston, Department of Chemistry, University of Lancaster,
Bailrigg, Lancaster, Lancashire LA1 4YA
Tel: 0524-65201 Fax: 0524-63806 Telex: 65111 LANCUL G
- Mrs C A Moules, KRÜSS GmbH UK,
120-122 Woodgrange Road,
Forest Gate, London E7 OEW
Tel: 01-519-5578 Fax: 01 555 1907

EDITORIAL

The bulk of this issue is taken up with a list of authors and titles of papers for the Golden Jubilee Conference in September. It is a very impressive list and the organisers are to be congratulated for attracting such a varied and high quality programme for this very important meeting. If you haven't registered yet, a form for that purpose is to be found in this Bulletin.

I would like to draw the attention of members to the notice relating to the Scott Blair Scholarship. This was first awarded in 1988 and the Society are now seeking candidates for the second such scholarship.

Members who have been asking about the proceedings of the Warwick conference should note that they have been subject to production delays and will not be available until June/July.

Peter Townsend

Peter Townsend



The Scott Blair Scholarship 1990

In memory of the work and example of Dr G W Scott Blair, the Society in 1988 instituted a series of scholarships to encourage excellence in research in rheology, and to enable the scholar to undertake research activities which would not normally be possible without such a grant, such as a period of work at an overseas University.

PhD students, or equivalent, who are completing their first year of research, and are members of the British Society of Rheology, may apply to become a Scott Blair Scholar.

The scholarship will have a value of £500 per annum (or such value as shall from time to time be decided by Council) to be used at the absolute discretion of the scholar. Subject to a satisfactory report from his supervisors, the scholarship will be renewable for a maximum of one more year. Thus it will usually be available during the second and third years of a normal PhD project.

In addition to the annual payment, Council will consider applications for additional funding to attend conferences. The scholars will be expected to present the results of their research at meetings of the Society, and to make occasional contributions to the Bulletin.

The award of the scholarship will be decided by Council, who cannot enter into correspondence with unsuccessful applicants, and who reserve the right not to award a scholarship in any particular year.

Applications for the 1990 Scott Blair Scholarship should reach the President as soon as possible. The application should be on no more than two sides of A4 paper and contain: personal details of the applicant, a description of the research, notes on any special uses envisaged for a proportion of the scholarship, and an endorsement from a person with supervisory responsibility for the research.

Joint British-Spanish-Portuguese Rheology Meeting

Molecular Structure and Rheology of Polymers

Estoril, Portugal, 23-25 November 1989

Some fifty rheologists participated in this joint meeting, with about half from the host nation and the remainder divided almost equally between the two other participating nations. The outcome was a varied and stimulating range of papers on different rheological topics, leading to what one hopes will prove to be the successful launch of a Portuguese Society of Rheology.

The scientific programme comprised six sessions, two on the Thursday afternoon and early evening, another two on Friday morning, and the last two on Saturday morning. The first session was refreshingly devoted to solids with David Clegg giving the opening invited talk on chemorheological studies on elastomers, which was followed by several contributed papers on various mechanical investigations of polymers by Spanish and Portuguese groups. In the following session on rheometry Eirian Jones gave the first invited talk on his controlled stress rheometer and Peter Townsend a second invited paper on the development of flow simulation software. The remainder of this session consisted on contributed papers on different rheological measurements including interesting presentations by Jim Ferguson, in which he compared and analysed data on elongational viscosity measurements, and also John Gearing on the interpretation of various dynamic mechanical analyses.

Sessions three and four on the Friday morning covered food rheology, biorheology and haemorheology, the first comprising three invited lectures, one by Professor Fortes (Lisbon) on structural and mechanical properties of cork, another by Geoff Brownsey on the association of food biopolymers and semi structured gels, and the third by Julian Vincent on the stiffness and fracture properties of biological composite materials, these three all breaking new ground for many present. The second session of the morning began with a paper by Ken Walters on interesting rheological properties of aqueous solutions of polyacrylamide and xanthan gum, proceeding through two Portuguese papers on the rheology of kappa-carrageenan/locust bean gum mixed gels and some bio-polysaccharides to a contribution on the surface rheology of somewhat similar liquids by Carole Moules. There followed three papers on haemorheology by Professor Berga (Barcelona), Professor Martins-Silva and Carlota Saldanha (both Lisbon), this being an area in which Portuguese rheology is particularly strong.

The first session on Saturday morning covered polymer solutions and melts opening with three invited talks from Professors Garcia de la Torre (Murcia, Spain), Riande and Aleman (both Madrid) on these themes. The remainder of this

session consisted of contributed papers from these groups, and also one from Galip Akay on flow induced polymer-filled interactions. The final session on suspensions, dispersions and liquid crystals began with two invited papers, the first by Douglas Hourston on the dynamic mechanical analysis of latices, and the second by Frank Leslie on theory for biaxial liquid crystalline systems. Fittingly the session closed with a paper by Professor Diago, our host, on the thermal dependence of the viscosities of nematic polymers.

The conference was held in the Hotel Atlantis lying between Sintra and Estoril close to Lisbon, which provided excellent facilities for such a small relaxed meeting. Indeed our Portuguese hosts did an excellent dinner on the Saturday evening. All agreed with our president's remarks at the closing ceremony that the Portuguese hospitality and friendliness had more than matched that of the West of Scotland. Our sole disappointment was that the Portuguese rain had surpassed even that of the Western Highlands!

Frank Leslie.

Dynamics of Polymeric Liquids

There will be an EEC sponsored meeting on the above subject at the hotel La Residenza in Capri from September 9-13, 1991. Attendance at the meeting will be restricted to 90 participants. Further information may be obtained from:

Professor K Walters
Department of Mathematics
University College of Wales
Penglais
Aberystwyth
Dyfed SY23 3BZ
UK.

The Guth-Gold Formula

The Guth-Gold formula for the viscosity of a suspension of spherical particles is always quoted, in the papers and books I have read, as

$$\eta = \eta_0 (1 + 2.5 \phi + 14.1 \phi^2)$$

where η_0 is the viscosity of the suspending medium, and ϕ is the volume fraction of the suspended particles.

In the abstract of the original paper by Eugene Guth and Otto Gold which appeared in Physical Reviews, 53, 322, 1938, it is seen that their formula is actually, in the above terms,

$$\eta = \eta_0 / (1 - 2.5 \phi - 14.1 \phi^2)$$

The two expressions are actually very different, although giving hardly different values for small values of ϕ . However, the two functions are of very different character, and the original Guth-Gold expression takes negative values for $x \geq 0.19196$, and can therefore not represent the real situation.

Can any reader give a reference to the paper in which the second formula was replaced by the first? Was it by Guth and Gold?

Z. Rigbi
Dept Chemical Engineering,
Technion - Israel Institute of Technology,
32000 Haifa
ISRAEL.

MEMBERSHIP NEWS

The following applications for Membership of the British Society of Rheology were approved at the Council Meeting on March 14th, 1990

Mr S Momani
Dept. of Mathematics
University College of Wales
Aberystwyth

fetsa FGMN

Mr W Whitcher
Raychem Ltd
Faraday Road
Dorcan
Swindon

fea CDFG

Mr J Locke
Raychem Ltd
Faraday Road
Dorcan
Swindon

eta CDFGJ

Mr B W Grover
Albright & Wilson Ltd
Trinity Street
Oldbury
West Midlands

fetsa G

Dr M F Webster
Dept. of Mathematics & Computer Science
University College of Swansea
Swansea

fetsa

Dr Deping Ding
Dept. of Mathematics & Computer Science
University College of Swansea
Swansea

fetsa DGH

Dr D M Hawken
Dept. of Mathematics & Computer Science
University College of Swansea
Swansea

fetsa DFJN

Dr E O Carew
Dept. of Mathematics & Computer Science
University College of Swansea
Swansea

fetsa DFJN

Mr Hamid Tamaddon
 Dept. of Mathematics & Computer Science
 University College of Swansea
 Swansea

petsa DEFJKMN

Miss H J Lomas
 SmithKline Beecham
 Clarendon Road
 Worthing

petsa FGJ

Mr A J Goodall
 SmithKline Beecham
 Clarendon Road
 Worthing

petsa FGJ

Mr J S Porteous
 Permarock Products
 Jubilee Drive
 Loughborough

pea FG

Dr M K Fitzgerald
 ICI Chemicals & Polymers Ltd
 PO Box 8
 The Heath
 Runcorn
 Cheshire

feta BCDFGJ

Dr L G Howarth
 Alcan International Ltd
 Southam Road
 Banbury

fetsa GHI

Mr A C Bickley
 Silent Channel Products Ltd
 St Johns St
 Huntingdon

petsa CFG

Mr T H Stephens
 Notts CC Materials Lab
 Willow Road
 Lenton
 Notts

pa K

Dr P R Whittingstall
 Carrimed Ltd
 Vincent Lane
 Dorking

fea DFGHJLM

THE GOLDEN JUBILEE

By the time you read this, there will only be about three months to go before the Edinburgh meeting. The list of 220 papers offered is given elsewhere in this Bulletin and other details can be found in the last two issues of the Bulletin.

Participants who wish to stay in Pollock Halls for one or two extra nights can arrange this through me. The cost is £19 per person per night for bed and breakfast, and the sooner you book this (and your accommodation for the conference) the more chance there is of accommodation being available.

Honorary members who wish to attend for one or two days should write to me with their requests. For example we can offer attendance at sessions on Thursday and Friday, with accommodation in Pollock Halls for one night, one breakfast, two lunches and the conference dinner for £70. If you can bear to be without the book of extended abstracts we can reduce the price to £55. Note that these charges are subsidised by the Society (and not by other participants); we cannot possibly extend the offer to all members.

We (the organizers) are grateful to all who have registered and paid early. There are 116 participants and 20 accompanying persons already registered (14th March). Those who paid early have saved themselves money and have enabled the Society to pay over £8000 as a deposit on 250 rooms in Pollock Halls. Half of these are already spoken for, but don't panic. We do have an option on more rooms and if you book soon we shall take up that option (and pay a few more thousand pounds).

You can contact me by telephone (091-222-6230, a direct line to my office), by FAX (091-261-0191) or by electronic mail (to Chris.Petrie @ UK.AC.NEWCASTLE) as well as by letter to the address on the registration form. FAXed and e-mailed registrations are acceptable to me, but I have discovered that FAXed cheques are not acceptable to the bank.

The organizing committee (Jim Ferguson - President, Nick Hudson - local arrangements, Carole Moules - exhibition and publicity, Ralph Oliver - editor of the book of the conference, Stephen Aldhouse and myself) look forward to welcoming you to Edinburgh.

Chris Petrie

REGISTRATION FORM

**British Society of Rheology, Golden Jubilee Meeting
Edinburgh, 3rd - 7th September 1990**

Please complete and send, with payment, to

*Dr C J S Petrie, Department of Engineering Mathematics, Stephenson Building,
University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, United Kingdom.*

Payment by cheque drawn on a British bank incurs no extra charge. Eurocheques for less than £200 are also acceptable. Please make cheques payable to the British Society of Rheology.

NAME: _____ TITLE: _____

ADDRESS: _____

Name and affiliation, for badge: _____

Accompanying person(s): _____

Please state any dietary or other special requirements.

ACCOMMODATION Please tick one of the alternatives (a), (b), (c) and (d):

Enter number of persons if more than one and adjust payment accordingly

- (a) I require university accommodation from 2nd September and enclose £105 ☐
(b) I require university accommodation from 3rd September and enclose £85 ☐
(c) I shall book through the Edinburgh Tourist Accommodation Service ☐
(d) I am making my own arrangements for accommodation ☐

FEES Please tick the appropriate box:

Full registration	£160	☐
Student registration	£130	☐
Accompanying persons	£70	☐

Please enclose payment for registration and university accommodation

TOTAL ENCLOSED: £ _____

Please state sending bank if payment is being sent by direct credit transfer.

TRAVEL ARRIVAL DATE: _____ TIME: _____

If you wish to be met at Edinburgh Airport please give your flight number: _____

GOLDEN JUBILEE CONFERENCE and THIRD EUROPEAN RHEOLOGY CONFERENCE

Sunday, 2nd - Friday, 7th September 1990

List of papers accepted, 12th March 1990. (Some titles are provisional.)

PLENARY LECTURES

S F Edwards

The rheology of granular flow.

H Giesekus

Carried along on a pathline in modelling constitutive equations of viscoelastic fluids.

A Ya Malkin

Some inverse problems in rheology leading to integral equations.

KEYNOTE LECTURES

D V Boger, D U Hur and C J S Petrie

The rheology of fibre suspensions.

J M Dealy

Challenges in process rheometry.

J Ferguson, K Walters and C Wolff

The rheological properties of polyacrylamide solutions in shear and extension.

G G Fuller

Infrared optical rheometry of multicomponent polymeric liquids.

R Keunings

Progress and challenges in computational rheology.

G Marrucci

Rheology of rodlike polymers in the nematic phase.

A Silberberg

Physiology, mechanics and rheology.

H H Winter

Rheology of polymer gels.

CONTRIBUTED PAPERS

K Adachi, S Nishida, Y Tsumura and R Nakamura

Formation limits of a stable vertical liquid film for curtain coating and film casting.

S G Advani and C L Tucker III

Closure approximations for three-dimensional orientational structure tensors.

S Affrossman, F S Baker, R E Carter, D Hayward and R A Pethrick

Theory and applications of the Strathclyde rheometer.

J V Aleman

Compression creep of molten low density polyethylene.

E Allen and D V Boger

Dispersion of non-Newtonian fluids in heterogeneous media.

D Aschoff and P Schummer

Rheometry of dilute solutions of polyelectrolytes.

G Astarita and P L Maffettone

Modelling of slit devolatilization of polymers.

F S Baker, R E Carter, M Rides and K Thomas

A high speed capillary extrusion rheometer for studying the rheology of dough moulding compounds.

F S Baker, R E Carter and M D H Thomas

Measurement of the pressure coefficient of viscosity as a function of temperature and pressure.

S I Bakhtiyarov

Magnetized polymer solution flow in porous media.

H Bao, O Manero and R K Gupta

Fibre spinning experiments on polyox and polyacrylamide solutions.

M Barraco-Serra and M A Adria-Casas

Detection and quantification of Barus effect in viscoelastic fluid mixtures.

M Barraco-Serra and M A Adria-Casas

Modifications of rheological polymer behaviour by ultra-sound application.

H Bauer and N Boese

Rheological properties of a micelle system in solution to be used as a reference liquid with viscoplastic behaviour.

A V Bazilevsky, V M Entov and A N Rozhkov

Liquid filament microrheometer and some of its applications.

A V Bazilevsky, V M Entov, A N Rozhkov and A L Yarin

Polymeric jets beads-on-string breakup and related phenomena

C Becker and P Schummer

Numerical investigation of break-up of viscoelastic liquid jets.

J J Benbow and J Bridgewater

The influence of liquid phase rheology on particulate paste extrusion.

H Benkreira, S Rutson and S Beckett

Rheological studies of chocolate in relation to flow and mixing during manufacture.

D Bertram

A new rheometer for viscoelastic measurements at high shear rates.

D M Binding and P R Jones

Entry and exit flows of non-Newtonian fluids.

R H Blanc

Determination of the rheological properties of solids using pulse propagation methods.

C Blom, H van den Ende and J Mellema

Torsion pendulum for measuring the dynamic moduli in a steady shear flow.

W H Boersma, J Laven and H N Stein

Experiments and computer simulations on the flow of concentrated dispersions.

G Bohme and D Nikolakis

Peristaltic flow of viscoelastic liquids.

H Braun

Rheological rate-type models including the temperature history.

B J Briscoe, M Kamyab and M J Adams

The characterisation of concentrated particulate suspensions that exhibit plasticity.

E Brito de la Fuente, J C Leuliet and L Choplin

Mixing and circulation times in rheologically complex fluids.

P O Brunn and J Holweg

The flow of surfactant solutions through porous media: universal laws.

R Buscall, W J Frith and I J McGowan

The rheology of weakly interacting colloidal particles at high concentration.

M-C T Calderer

On the mathematical modelling of texture in flows of polymeric liquid crystals.

J Castle, R C E Guy, P A P Hastilow and D Janes

The rheological properties of extrusion cooked wheat starch in the moisture range 25-35 per cent.

M S Chai and Y L Yeow

Investigating the elongational behaviour of Boger fluids using the gravity-drawn jet arrangement.

H D Chandler and R L Jones

Viscometric properties of a dense aqueous silica slurry containing iron (III) oxide and tin oxide.

D C-H Cheng

The use of viscometers as mimics of flow processes.

R P Chhabra

Flow of power law fluids through assemblages of spherical particles.

K Chiba, T Sakatani, S Tanaka and K Nakamura

Further observations of anomalous entry flow patterns through a planar contraction.

H Chmiel, M Schuttoff, E Walitza and V Wessling

Rheology and mass transfer in mycelial fermentation broth.

L Choplin, M Moan, A Tecante and S Bisson

The rheology of unheated Gellan gels.

F Cocchini, M R Nobile and D Acierno

Rheological behaviour of a thermotropic liquid crystal copolyester: hydroxybenzoic acid / 2,6-hydroxynaphthoic acid (HBA/HNA).

A A Collyer, D W Clegg and R H Mayhue

The rheology of blends of gelatin and fast gelling agents for injection moulded fruit gums.

M J Crochet and V Delvaux

Inertial effects in viscoelastic flow.

J M Davies, T E R Jones and K Golden

Non-linear effects on a controlled stress rheometer.

C G de Kruif and A T J M Woutersen

Rheo-optics of adhesive hard sphere dispersions.

B Debbaut

On the influence of inertia and extensional viscosity upon lip and corner vortices in a circular contraction.

Yu F Deinega, G B Froysheter and Ya A Verbitsky

Deformation of plastic disperse systems (PDS) at low shear rates.

A Delgado, S Berg, R Kroger and H J Rath

Theoretical considerations on the steady rod climbing at vanishing influence of gravity.

C D Denson and J F Nangeroni

The influence of rheology on interphase mass transfer rates in molten polymers undergoing extensional flows.

Deping Ding, P Townsend and M F Webster

A computer code for simulating transient non-isothermal flows of non-Newtonian fluids.

J Dohmann

Anisotropic turbulence in aqueous surfactant solutions.

I A Dukhovskii, P I Kovalev and A N Rozhkov

Shock disintegration of polymer solutions.

D Dupuis

Measurement of the normal stress coefficients by means of an optical technique.

N El Kissi and J M Piau

Flow of entangled polydimethylsiloxanes through capillary dies. Characterization and modelling of wall slip phenomena.

I Emri and N W Tschoegl

Determination of a discrete response time distribution from experimental responses.

S Ertong and P Schummer

On the rheological properties of rubber compounds containing different carbon black concentrations.

A Franck and M McGoldrick

The application of rheometry in the testing and characterization of speciality thermoplastics.

C Friedrich and T Seidel

Viscosity measurement during the cooling of a crystallizing glass.

R Gaglione, P Attane and A Dunand

A high frequency rheometer to measure complex viscosity.

C Gallegos and L Choplin

Influence of oil phase concentration and temperature on linear viscoelastic properties of mayonnaise.

B Gampert and M List

Polymer molecule-flow field interactions in turbulent pipe and steady shear flows of aqueous solutions of polyacrylamide.

B Gampert and J Domjahn

The onset of stationary motion in viscoelastic Rayleigh-Benard convection.

A Geissler and W Schmitt

Investigations of a closed-cell foam with scanning electron microscopy.

A Geissler and H Weber

Experimental investigations of the dynamic behaviour of compounds under preloading.

E Geissler and H Weber

Constitutive equations for dynamically loaded polymer solids and their application in a finite element program.

G C Georgiou, W W Schultz and M J Crochet

Singular finite elements for fluid flow problems with stress singularities.

D W Giles and M M Denn

Rheometer strain and strain rate errors.

D W Gillings

Historical remarks on Freundlich's work.

J D Goddard

Quasi-static mechanics of dense granular media.

J C Godfrey

A power-law model of thixotropy.

N Grizzuti

Rheological properties of liquid crystalline hydroxypropylcellulose aqueous solutions.

D J Groves

Isotropic and anisotropic shear flow in continuous fibre thermoplastic composites.

A F Guerrero and H R Ball

Dynamic viscoelasticity of mayonnaises containing different egg products.

D Hadjistamov

Time-related flow behaviour of shear thickening systems.

Han Shifang

A constitutive equation theory of viscoelastic fluids.

Han Shifang

Unsteady fibre spinning of viscoelastic fluid.

Han Shifang and Wang Yubin

Drag reduction by addition of konjaku flour for turbulent flow in a circular tube.

O Harlen

Birefringent strands.

A Harnoy

Investigation of instability in rheological equations of the differential type.

S Hazanov

On propagation of discontinuities in nonlinear hereditary media.

P Henriksen and O Hassager

Three-dimensional flow simulation in non-Newtonian fluids.

L Heymann

The use of pseudorandom test signals in the rheometry of linear-viscoelastic materials.

E J Hinch

Uncoiling polymer chains in sudden transient strong flows.

R Hingmann, H M Laun, W Goring and T Dirking

The rheological behaviour of waterborne basecoats.

J Honerkamp

Inverse problems in rheology.

C Hubner and R G Stacer

Recovery of strain-induced damage in filled and unfilled elastomers.

N E Hudson, J Ferguson and B C H Warren

Fluid failure mechanisms in stretching flows: extensional viscosity and complexation.

C Huet and P Navi

Tri-dimensional effective properties of quasi-periodic viscoelastic anisotropic composite materials through a new homogenization technique.

J C Hyun

Stability of melt spinning processes.

Ya Ivanov, Al Popov and E Dimitrova

Rheological properties of iron-free kaolin/water suspensions.

Jaeon Chang and Seung Jong Lee

Numerical study on the die swell of semiconcentrated fibre suspensions.

D F James

Extensional viscosity, an elusive property of mobile liquids.

S G James, P Navard and C Noel

Band textures in liquid crystalline polymers subjected to elongational flows.

I R Jenkinson

Bulk rheology of seawater.

Jiandi Lai and K Strauss

Numerical simulation of the flow of two non-mixable inelastic or viscoelastic fluids with free interface.

R L Jones and R R Horsley

The influence of concentration and particle shape on the rheology of silica, fly ash and other industrial slurries.

R S Jones and A B Wheeler

Transverse flow of fibre-reinforced composites.

R S Jones

Equivalent Oldroyd models.

V M Kamath and M R Mackley

The rheometric characterization of flexible chain and liquid crystal polymers.

R Keiller

Flow round corners.

Z Kemblowski, P Budzynski and P Owczarz

On-line measurements of the rheological properties of fermentation broth.

R Kharrat and S Vossoughi

Simulation of viscoelastic fluid flow past a cylinder using the "method of lines".

C Klason, J Kubat and O Quadrat

Excess thermal noise generated during the capillary flow of poly(ethylene oxide) solutions. Part I. The influence of the solvent.

J L Kokini

Simulation of steady shear and small amplitude oscillatory measurements of hard and soft wheat doughs using corotational Jeffreys model.

J L Kokini

The role of elasticity on expansion of corn flour extrudates.

J Konupek

The influence of modification of particle size of ceramic suspensions upon their apparent viscosity.

E V Korobko

Rheodynamics and heat transfer of dielectric suspensions in constant electric fields.

R Kotsilkova and W Gleissle

A study of transient and steady-state shear and normal stresses in glass fibre suspensions.

R Kotsilkova, W Gleissle and Ya Ivanov

Rheology of short fibre filled polymers.

K Koyama, T Oota and K Tanaka

Elongational flow behaviour of supercooled polyethylene melt.

S G Kulichikhin and A Ya Malkin

On the influence of phase separation on the rheology of oligomer curing.

V G Kulichikhin and N A Plate

Rheology and structure of polymer blends containing liquid crystalline components in melt and solid state.

M K Kurbanaliev, R T Kadirov, V E Dreval and Kh M Abdullaev

Effect of liquid media on stress-strain and rheological properties of linear polymers in uniaxial extension below and above their glass transition temperatures.

R Lacroix, F Bertrand, P A Tanguy, L Choplin and E Brito

Three-dimensional modelling of mixing with an helical ribbon-screw impeller.

K R Langley, M L Green and A Martin

Rheological and structural properties of model composite foods.

R Lapasin, S Pricl and I Colombo

Rheology of filled scleroglucan gels.

J Laven and H N Stein

Rheology of dispersions in non-Newtonian media: an improved definition of the relative viscosity.

J L Leblanc

Wall slippage and the flow of rubber compounds in converging path.

D M B Leite, L Piazza and P Masi

Characterization of the bread steeling process by means of an Instron universal testing machine operating in dynamic mode.

J S Lavery and F M Leslie

Rheological properties of biaxial nematic liquid crystals.

Li Jian and T Q Jiang

A constitutive equation for Tian-Qin gel.

R Lipp

Modelling of multilayer flow with two free boundaries of structured liquids using the finite element method.

H Luyten, W Kloek and T van Vliet

Rheological properties of xanthan and xanthan-galactomanan gum mixtures.

I Machac, J Cakl and P Mikulasek

Flow of polymer solutions through beds of solid particles.

M E Mackay, C-H Liang and C Jinan

Rheology of rigid macromolecules in the semi-dilute regime.

M E Mackay

Rheology of small samples.

A C Mackie

High solids-loading paste rheology.

W Mader-Hipp

Measuring yield points instead of calculating.

C W Manke and M C Williams

Transient stress responses predicted by the internal viscosity model in elongational flow.

T C B McLeish

Molecular rheology of polymer gelation.

G Marin and Y Lanfray

The effect of molecular weight distribution on the elongational properties of polymers.

T P McMahon and C W Manke

Oscillatory shear flow of internal viscosity (IV) dumbbells with high IV.

C D Meier

Yield stress measurements.

J Mellema, J J Beekwilder and C Blom

A rheological study of the structure of microemulsions.

J Mellema, H J Holterman, E J 's-Gravenmade, H A Waterman and C Blom

Rheology of human saliva and saliva substitutes.

J Mewis and E Van der Aerschot

Equilibrium properties of reversibly flocculated dispersions.

P Mitschka

Rotational boundary layer flows of non-Newtonian fluids.

E Mitsoulis and X-L Luo

Convergence studies in the numerical simulation of viscoelastic melts using the K-BKZ model.

M Moan and A Delime

Flow-induced migration of hard spherical particles dilutely suspended in capillary tubes.

M Moan and A Omari

Rheology of associating polymer solutions.

P Moldenaers and J Mewis

Intermittent shear flow in liquid crystalline polymers: rheo-optical behaviour.

C A Moules and B Warburton

The surface rheology and surface tension of dilute collagen solutions with formulation additives.

H Muller-Mohnssen and A Tippe

Experimental determination of slip layer properties in polymer solution flow.

J Munoz, C Gallegos, V Flores and A Santamaria

Viscoelastic properties of a hexagonal surfactant liquid crystal.

N Ohl and W Gleissle

Measurement of the rheological properties of suspensions based on viscoelastic liquids by means of a cone-and-plate- and a capillary-rheometer.

D R Oliver

Load enhancement effects in loose-fitting bearings caused by the presence of polymeric additives in the lubricant.

H C Ottinger

Elastic recovery from the Curtiss-Bird model.

D S Pearson, E Herbolzheimer, G Marrucci and N Grizzuti

The behaviour of entangled polymers at high shear rates.

E Peuvrel and P Navard

The viscosity of a smectic main-chain polymer.

C J S Petrie and M E Mackay

Thought-experiments in extensional flow of polymer solutions.

F Petruccione and P Biller

Continuous time simulation of polymer melt models.

N Phan-Thien and R I Tanner

The flow of a viscoelastic fluid past a sphere.

S Piontek and T Dirking

The rheology of waterborne metallic basecoats for the automotive industry and its influence on the application properties.

A N Prokunin

On some rheological effects arising under durable strains of polymeric liquids.

E V Prut

Critical phenomenon of plastic flow.

E-O Reher, R Schnabel and V Schulze

Use of amplitude and frequency spectrometry for determining the sol-gel phase transition.

P A Reynolds

Association thickening of polymer latex dispersions.

P Riha and A Prucha

The effect of the particle aggregation on the rheological and thermal properties of sheared suspensions.

H P Ronningsen

Yield stress and viscosity measurements on North Sea crude oils using model pipeline and controlled stress rheometer.

L Rubart

Finite element analysis of shear-thinning flow problems in mixing vessels.

A Saasen and O Hassager

Influence of time constants on phase velocity and damping rates of gravity waves on Jeffreys fluids.

O Yu Sabsai

Flow in channels of filled and unfilled gas-containing polymer melts.

O Yu Sabsai, E K Borisenkova and V A Optov
Uniaxial tensile strength of polymer fluids.

S D Salt
Effects of neutralisation techniques and cosolvent levels on the rheology of Carbopol gels.

S D Salt
Use of Newtonian viscosity to predict sedimentation rate in time-temperature monitors.

J D Schieber, F A Petruccione and P I Biller
A new microscopic model for polymer melts and concentrated solutions.

J Schneider
Dissipative effects in rheometric flows and the determination of material functions of polymer melts.

A N Semenov
Dynamics of nematic solutions of persistent macromolecules.

J Sestak, M Houska, R Zitny and M Dostal
Helical flow of power-law fluids.

V D Sevruk
The test method of polymer melt by the elongational deformation.

N V Shakirov and I O Glot
The rheological response of dilute polymers and the analysis of their flow inside and outside channels.

Z P Shulman, B M Khusid, E A Ivashkevich and N O Vlasenko
Rheokinetics, flow and convective heat transfer of polymerizing oligomers.

D A Siginer
Unsteady shear flows of viscoelastic liquids driven by periodic forcing.

P Sittart and H-W Bewersdorff
Up-scaling in heterogeneous drag reduction systems.

J B A F Smeulders, C Blom and J Mellema
Linear viscoelastic measurements of lipid vesicle dispersions; hard-sphere behaviour and bilayer surface dynamics.

V Sobolik and O Wein
On practical use of flow enhancement by superposed oscillations.

Z Sobotka
Non-linear functional relations and superposition principles in thermorheology.

W Song, F A Mirza and J Vlachopoulos
Thermoforming of thermoplastics.

R G Stacer

Autohesion in the presence and absence of interfacial mass transfer.

Ph Steiert

Low shear rate and shear stress viscosities of hydrolyzed high molecular weight polyacrylamide solutions in water, water and sodium chloride, water and glycerol, water glycerol and sodium chloride.

Ph Steiert and C Wolff

Time and shear stress dependence of the rheological properties of hydrolyzed high molecular weight polyacrylamide solutions in water-glycerol mixtures.

A Stone and A E Bell

Rheology of cocoa liquor using dynamic oscillatory testing.

T A Suck

The digital viscometer, a new generation of rheometers.

P A Tanguy, R Lacroix and F H Bertrand

Three-dimensional modelling of the injection moulding process.

P A Tanguy, R Lacroix and L Choplin

Three-dimensional modelling of rheologically complex fluid flow in a LPD Dow-Ross static mixer.

M Tazi

Newtonian and non-Newtonian fluid flow through small bifurcations.

A Terentyev, L Rudzinski and G Kunnos

Equation of the state of thixotropic medium under mechanical influences.

Q K Tran, J A Reizes and R R Horsley

The effect of chemical additives on the drag and settling velocities of particles in yield stress slurries.

B van den Brule

Anisotropic conduction of heat in polymeric materials.

J M van der Veer, J H J van Opheusden and R J J Jongschaap

A study into the rheological behaviour of sheared colloidal suspensions using Brownian dynamics.

I Vlahopolou and A E Bell

The application of oscillatory testing to bovine and caprine yoghurt gel systems.

V S Volkov and V G Kulichikhin

Rheology of anisotropic viscoelastic fluids.

A Von-Ziegler, C Alvarez-Gayosso and B Mena

Further developments in extrusion through oscillatory dies.

E Wabtabase, B Brockway and A E Bell

Mechanical and thermal properties of gluten.

M H Wagner

The nonlinear strain measure of polyisobutylene melt in general biaxial flow and its comparison to the Doi-Edwards model.

O Wambersie and M J Crochet

Finte element method for steady three-dimensional viscoelastic extrusion.

L T Wardhaugh and D V Boger

The rheology of waxy crude oils.

R E Wetton and R D L Marsh

Rheological and dielectric property changes during thermosetting reactions.

E Windhab, V Denk, B Wolf and H Nierschel

Stress-strain relationship of small deformable bodies under steady and unsteady flow conditions in Newtonian and viscoelastic media.

H H Winter, M Baumgaertel, P Soskey and S Venkataraman

Computer aided rheometry.

A T J M Woutersen and C G de Kruif

The rheology of adhesive hard sphere dispersions.

Y G Yanovsky

The role of the dynamic rheological approach in kinetorheology.

D N Yemelyanov

The complex of viscosimeters - dilatometers for study of polymerization rheokinetics.

D N Yemelyanov and N K Kireyeva

Gelatination rheology of water-salt solutions of poly(vinyl alcohol).

D N Yemelyanov, B V Myasnikov and L I Myasnikova

The role of macromolecule hydrophobization in structural-rheological properties of acrylic polymer water solutions.

D N Yemelyanov and I Ye Smetanina

Structural-rheological states and properties of polymerizing vinyl monomers.

S Zahorski

Fibre spinning with axial and radial viscosity distributions as viscoelastic flow with dominating extension.

F Zahradnik

Secondary relaxations in polymers containing phenyl rings.

Zhou Cheng-dong, T Q Jiang and Zhu Jia-ying

Study on the shear stress and normal stress of foam.

A Ziabicki

Stress-orientation relations in polymer fluids.

CONFERENCE DIARY

Date	Place	Details
16/5/90	Nottingham U.K.	'Rheometry in food process control: Has it a future' - Joint SCI Food Group/BSR meeting contact: Mrs L. Moseley, Dept of Applied Biochemistry & Food Science, University of Nottingham, Sutton Bonington, Loughborough.
17-20/5/90	Nice France	Sixth Annual Meeting of the Polymer Processing Society contact: Michel Vincent - CEMEF, Ecole des Mines de Paris, Rue Claude Daunesse - Sophia Antipolis, 06560 Valbonne, France.
5/90	Montpellier France	'Unilateral contact and dry friction' contact: Prof J.J. Moreau, Laboratoire de Mécanique Générale des Milieux Continus, USTL, 34060 Montpellier Cedex, France.
2-4/7/90	Vienna, Austria.	'The effect of phase transformation in solids on constitutive laws' contact: Prof F.G. Rammerstorfer, Institute of Light Weight Structures, Technical University, Gußhausstraße 27-29/317, 1040 Vienna, Austria
23-25/7/90	Brno Czechoslovakia	'International Symposium on Polymer Analysis and Characterization' contact: Dr Josef Janca, Inst. Analytical Chem., Czech. Acad. Sci., Leninova 82, 61142 Brno, Czechoslovakia.
24-26/7/90	Cambridge U.K.	'Polymer Blends' contact: Dr D.J. Hourston, Dept. of Chemistry, University of Lancaster, Bailrigg, Lancaster, Lancashire LA1 4YA, U.K.
27-30/8/1990	Hamburg, W Germany.	'The time-dependent behaviour of ice' contact: Professor O. Mahrenholz, Technische Universität Hamburg-Harburg, Eissendorfer Strasse 38, 2100 Hamburg 90, German Federal Republic.

- | | | |
|-------------|--------------------------------|--|
| 3-7/9/90 | Edinburgh,
Scotland, U.K. | 'Third Conference of European Rheologists'
and 'Golden Jubilee Meeting' British Society
of Rheology', contact Dr. C.J.S. Petrie,
Dept. of Engineering Mathematics, University
of Newcastle upon Tyne, Newcastle upon
Tyne, NE1 7 RU, U.K. |
| 11-13/9/90 | Bristol
U.K. | Faraday Discussion No. 90 : 'Concentrated
Dispersions'
contact: Mrs Y A Fish, Royal Society of
Chemistry, Burlington House, London,
W1V 0BN |
| 27-28/10/90 | Liège
Belgium | 'Polymer chemistry in extruder'
contact: Mme A.Choprix, ULB - Campus de la
plaine, CP 206-4, Bd du Triomphe, B-1050
Brussels, Belgium. |
| 3-6/12/90 | St. Etienne,
France. | 'Experimental identification of the mechanical
characteristics of composite materials and
structures', contact: Prof A.Vautrin,
Dept. Mechanical and Materials Eng., Ecole des
Mines de St-Etienne, 42023 St.Etienne Cedex 2,
France. |
| 7-12/1/91 | Tucson
Arizona
USA. | 'Third International Conference on
Constitutive Laws for Engineering Materials:
Theory and Application,
contact: Professor C.S.Desai, Dept. of Civil
Engineering and Engineering Mechanics, Univ.
of Arizona, Tucson, AZ 85721, USA. |
| 15-17/1/91 | Aussois
France | 'Response of shear flows to imposed
unsteadiness'
contact: Dr G.Binder, Institut de Mécanique
de Grenoble, B.P. 53 X, 38041 Grenoble Cedex,
France. |
| 21-24/1/91 | Villard-de
-Lans
France. | 'Extensional viscosity determination for the test
polymer solution D5.'
contact: Prof K.Walters, Dept of Mathematics,
UCW, Aberystwyth, Dyfed, U.K. |

I F S T RESEARCH GROUP

in collaboration with

SCI Process and Sensing Control Forum

The SCI Food Group and the British Society of Rheology

DISCUSSION MEETING

**RHEOMETRY IN FOOD PROCESS CONTROL:
HAS IT A FUTURE?**

at

The School of Agriculture, Nottingham University

on

Wednesday 16 May 1990

In addition to a comprehensive discussion of on-line rheological methods applicable to food systems, at least one, and possibly two, new dynamic rheometers will be presented. The programme will also include novel results on the relevance of rheological measurements to the organoleptic properties of foods. Time will be made available for delegates to discuss their own rheological problems with speakers.

PROGRAMME

- 10.30 Coffee and Registration
- 11.00 A Review of on-line rheological measurements
- Dr D Cheng
Warren Springs Laboratory
- 11.45 The potential of rheology for on-line measurements on food related systems
- Dr T A Huang and J M Starita
Rheometrics Inc; New Jersey, USA
- 12.30 An on-line process control rheometer for biological suspensions
- Professor Z Kemblowski
Chemical Engineering Institute
Technical University of Lodz, Poland
- 1.00 Lunch
- 2.00 Rheological measurements for the characterisation of perceived textural attributes
- Professor E R Morris
Cranfield Institute of Technology
- 2.45 Dynamic rheology - Application to the formulation of a real food product
- N A Hill
Department of Food Science and Nutrition
Kings College, University of London
- 3.15 A new dynamic rheometer
- Dr M Cheema
Department of Pharmaceutical Sciences
University of Nottingham
- 3.45 Discussion

Registration Form

Please register me for the Discussion Meeting entitled "Rheometry in Food Process Control. Has it a Future?"

I enclose a cheque payable to:
'Midland Branch, Food Science & Technology Education Trust Fund'

Cost including lunch, tea and coffee

Members of IFST, SCI or British Society of Rheology	£37
---	-----

Non-Members who are not students	£67
----------------------------------	-----

Students (including research students registered for a higher degree)	£15
---	-----

Name (Dr/Mr/Mrs/Miss).....

Affiliation.....

Address.....

.....

.....

Telephone and/or Fax No.....

Please send the completed form to:

Mrs Lynne Moseley
Department of Applied Biochemistry & Food Science
University of Nottingham
Sutton Bonington
Loughborough LE12 5RD.

Tel No: (0602) 484848 Ext. 8125

Fax No: (0509) 673917

Further details can be obtained from Dr John Mitchell or Mrs Lynne Moseley at the above address.

**"Extensional Viscosity determination for the test
polymer solution D5"**

at the Grand Hotel de Paris, Villard-de-Lans, France
from Jan 21-24 1991.

The meeting will take the form of a Workshop to discuss
extensional viscosity determination for a particular
polyisobutylene in decalin solution.

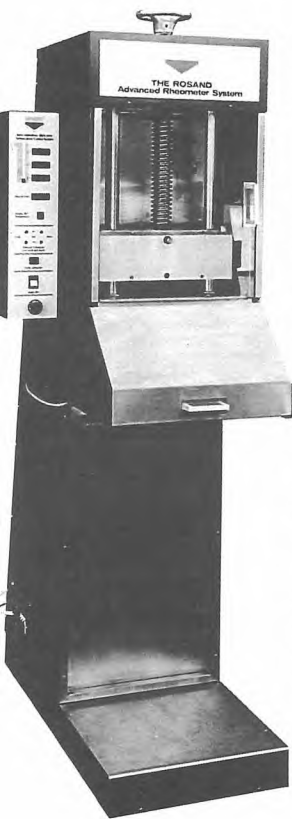
Approximate cost: Hotel, meals etc £180, Registration Fee £50;
accompanying persons £150 with no Registration Fee.

Further information may be obtained from:

Professor K Walters
Department of Mathematics
University College of Wales
Penglais
Aberystwyth SY23 3BZ
Dyfed, UK

Tel: (0970) 622750
Fax: (0970) 617172
Telex: (0970) 35181 ABY UCW

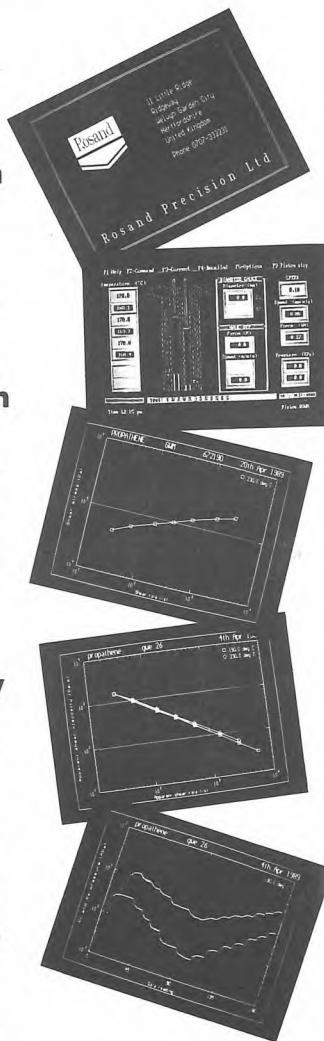
COMPUTER CONTROLLED TWIN SCREEN CAPILLARY RHEOMETERS



Rosand twin screen computer controlled rheometers have been developed to cater for the expanding involvement in rheology examination by an increasing number of industries. They have been designed to carry out all measurements, calculations and computations automatically and present the necessary information in palatable form.

Computer control allows the operator to obtain all the required information in a fraction of the time taken by manual methods. All controls are located on a single keyboard and the twin screens simultaneously monitor and display the test parameters presenting a graphical analysis of the results and measurements.

The Rosand range varies from a single barrel, single bore rheometer to a twin barrel, twin bore system for the measurement of complex rheological behavior on a regular basis.



ROSAND

ROSAND PRECISION LIMITED

11, Little Ridge, Welwyn Garden City,
Hertfordshire AL7 2BH, England.

Tel: (0707) 332231/2 Fax: (0707) 372170. Telex: 826542

FOR VISCOSITY CONTROL...



WE'VE GOT THE RIGHT INGREDIENTS. HAVE YOU?

Take a company that's been manufacturing viscometers for fifty years and more.

Add real technological expertise.

Add solid exhaustive knowledge of the product and its capabilities.

And what have you got?

Brookfield.

Only Brookfield can offer high quality, high specification instruments at a very affordable price.

You'll find Brookfield viscometers in laboratories and in demanding industry applications too.

What's more, our vast range of viscometers is backed up by a full range of accessories.

Brookfield viscometers. A recipe for success.

EXPERT 24-HOUR REPAIR SERVICE & NEW NATIONWIDE SALES NETWORK. Send for a copy of our Free Catalogue and details of your nearest Brookfield distributor.

BROOKFIELD

Carri-Med

New Control Electronics for the Weissenberg Rheogoniometer

For faster measurements and increased accuracy.

The new electronics form part of Carri - Med's extensive Development programme for the Weissenberg Rheogoniometer.

The new compact electronics have eliminated many of the time consuming operations that were previously carried out manually.

Automatic Gap and Gap Zero Setting.

Oscillation amplitude can be automatically pre - set without the drive motor running.

Stable drive motor speeds achieved 10 times faster than previously possible.

Now IBMPC / IBMPC compatible with state of the art software.

Autoranging LVDT module with remote control zeroing.

The Control Electronics are available as a simple upgrade to existing users (with exception of non compatible R17's).
Contact Carri - Med for a demonstration.

CARRI-MED

For greater understanding

Carri-Med Limited, Glebelands Centre,
Vincent Lane, Dorking, Surrey. RH4 3YX.
ENGLAND.

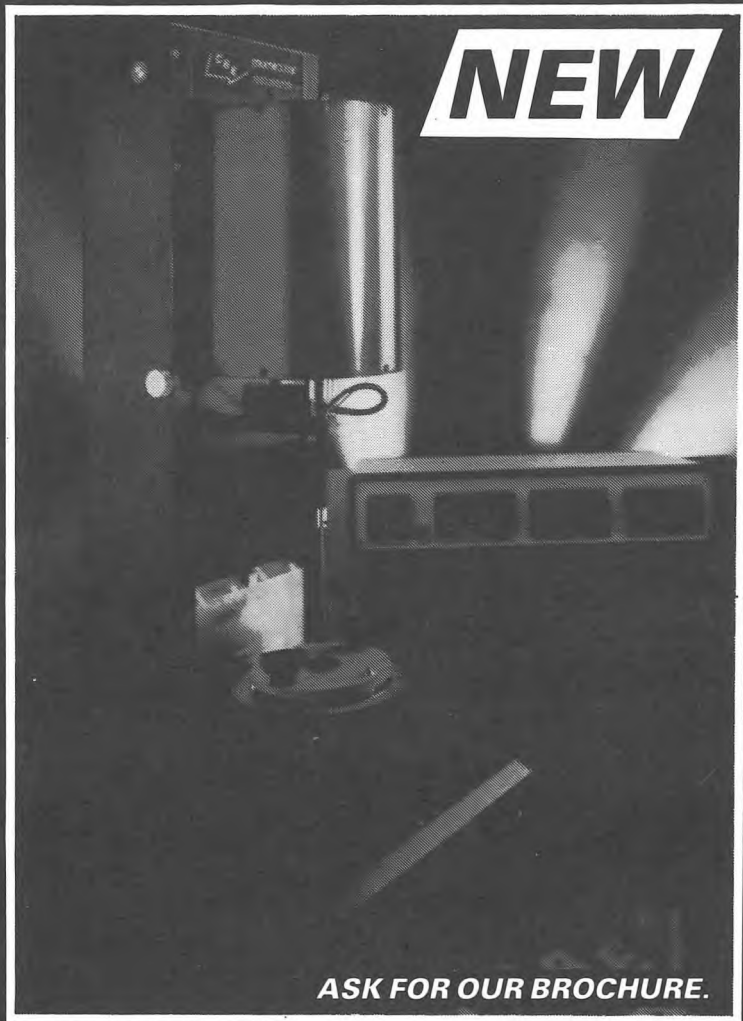
Telephone: (0306) 886180.
Telex 859115 CARIN G.
FAX: (0306) 885863 CARIN



STRATHCLYDE RHEOMETER

PROBLEMS WITH MEASURING ?

• FLOW • CURE
• PROCESSING • EXTRUSION



ASK FOR OUR BROCHURE.

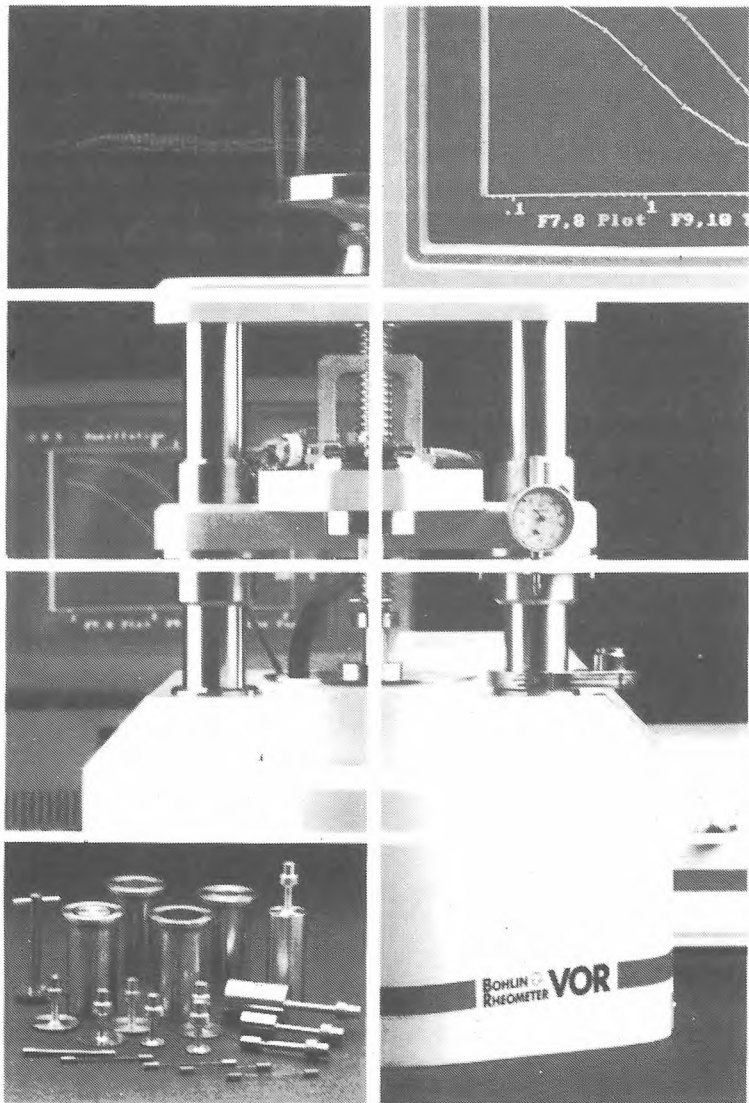
FOR LIQUIDS AND CURING SYSTEMS
UP TO AND BEYOND THE GEL
POINT. ALSO, CAPILLARY
EXTRUSION RHEOMETERS AND
OTHER RHEOLOGICAL INSTRUMENTS.



CARTER BAKER ENTERPRISES Ltd.
2 Marshbrook Business Park, Marshbrook,
Church Stretton, Shropshire, SY6 6QE, England.
Telephone: 06946-466/7. Fax: 06946-468.
Telex: 93-12-10-22-87 CBG
Email: Gold 72: MAG 31999

AGENTS REQUIRED

Bohlin VOR Rheometer



CUSTOMER TRAINING • CONSULTANCY • CONTRACT RESEARCH • APPLICATION SUPPORT

YOUR PARTNER IN RHEOLOGY

Bohlin Reologi supply and maintain a wide range of versatile rheometers and viscometers, world renowned for their software capabilities and wide range of accessories.

Full details and demonstrations of the Bohlin VOR controlled stress and portable viscometer

range are available on request from our office in Letchworth.

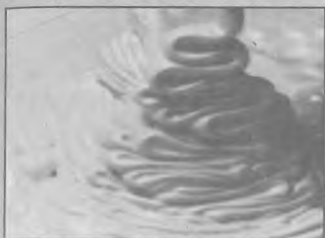
BOHLIN REOLOGI

Bohlin Reologi UK Ltd, Office 6, Business Centre, Avenue One, Business Park, Letchworth Garden City, Herts SG6 2HB.
Tel: (0462) 675537 Telex: 827547 (CGBUS Ref: BR)

Thermoplastics



Thermosets



Suspensions and Emulsions



Elastomers

action rheaction

**Rheometrics
Instruments for material
evaluation**

Viscosity
Elasticity
Yield stress
Thixotropy
Cure behavior
Thermomechanical properties
Impact

Rheometrics develops and manufactures a complete line of rheological and impact testing instruments for research, product development, quality control and process control.

Rheometrics instruments are used widely in evaluating materials such as thermoplastics, thermosets, elastomers, fluids and suspensions.

Rheometrics UK

Market House, 62 St Judes Road
Englefield Green, Surrey TW20 0BU
Phone (0784) 39694/5

Rheometrics Europe GmbH

Hahnstrasse 70
D-6000 Frankfurt 71
(West Germany)
Phone (069) 6 66 68 36

Rheometrics®

RHEOLOGY - a matter of survival for the Anemone fish.

The Anemone Fish wears a protective mucus which masks his protein skin. With this coating he can dive cheerfully into the otherwise poisonous tentacles of the Sea Anemone, for titbits of food.

It's the rheology of the mucus that prevents it being washed away and also resist the stresses of gravity. Without special visco-elastic properties, the coating would sag, and expose our hero.

The Carri-Med CSL Rheometer can measure and quantify such rheological properties for a whole range of materials including gels, pastes, suspensions, liquids and semi-solids.



This computer - controlled instrument uses the techniques of flow, creep and oscillation to characterise the properties of a whole range of materials. These properties can be used to predict and control the behaviour of the materials during manufacture, storage and use.

As part of our philosophy of total customer support, software for the CSL Rheometer is continually updated free of charge, during the first two years of ownership.

Through this service, and our regular User Seminars and free Analysis reports, Carri-Med customers have access to the most up-to-date information in the field of Rheology.

Carri-Med offer a wide selection of viscometers and rheometers ranging from simple quality control viscometers, to a rheometer measuring complex rheological phenomena. (Including Weissenberg Rheogoniometer & Elongational Viscometer).

Don't be stung by outdated equipment. Try the Carri-Med CSL Rheometer in your laboratory.

CARRI-MED

For greater understanding



Carri-Med Ltd., Carri-Med House,
Glebelands Centre, Vincent Lane, Dorking, Surrey,
RH4 3YX, England. Telephone: (0306) 886180.