
THE BRITISH SOCIETY OF RHEOLOGY



BSR BULLETIN
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EDITORIAL

Well, this is it – my last Bulletin. Thank you all for your contributions and support during the last four years – I hope you've enjoyed the changes. Handing over now to Oliver Harlen, to whom I wish the very best wishes.

Paul Doody

SUBMISSIONS TO THE BULLETIN

Submissions to the Bulletin may be made by any practical means – post, email, disk, fax, pigeon, donkey, et cetera but electronically is preferred (saves typing...). Most packages supported (Word, TeX, LaTeX, WordPerfect, ASCII, RTF) but always provide a contact name, address, eMail, or telephone number in case of problems.

Copy dates are now fixed at 15 December, 15 April, and 15 August. This should allow me to publish in January, May, and September and, as always, all contributions are gratefully received.

Late copy can sometimes be accommodated, however the facilities of the BSR and ESR web sites may also be appropriate. Please contact the Editor for details.

COVER ILLUSTRATION

The cover illustration shows the extrusion of hollow bricks, using a extruder which is terminated with a complex die, through which the paste flows through multiple openings that do not always have the same size. During the flow of a material through such an extruder, flaws can be induced which can lead to imperfect extruded bodies. A model to study ceramic paste plastic flows in complex dies has been proposed, and the flow balance in a multiple die extruder has been studied.

Taken from the paper "A model for recombining clay paste plastic flow in dies", by F. X. Mortreuil, C. Lanos & M. Laquerbe (GRGC, Laboratoire Matériaux, INSA Rennes, 35043 Rennes Cedex, France), published as Proceedings of the XIIIth ICR, Cambridge, UK (2000) 3-400 to 3-402.

I'd like to remind everyone that suggestions for Black & White or colour pictures (preferably of a rheological nature!) are welcomed by Oliver Harlen (Bulletin Editor), Gary Tucker (Abstracts Editor) or Nick Hudson (Publications Manager). Suggestions are always welcome!

BSR NEWS

Commentary on the 303rd BSR Council Meeting

In the week following the General Election, the BSR council converged on Westminster. The 303rd Council meeting took place at the Institute of Chemical Engineers, a stone's throw from the Houses of Parliament. On the way to the meeting I nearly collided with Anne Widdecombe crossing the road outside the House of Commons – not sure whether this was an omen!

The meeting started with a discussion of the new cabinet – the display case for the Society's treasures to be placed in the Scott Blair library. These include a facsimile of Boltzmann's laboratory notebook and the gavel, of which more later.

As ever, Europe provided plenty of lively discussion. In this particular instance the discussion focussed on the form and frequency of future European congresses and scientific meetings. However, the final decision will take place at the next European Congress in Erlangen.

Much of the meeting was devoted to electronic communication – exploring new ways of communicating with the membership through email and the web. There are lots of possibilities including electronic versions of Bulletin and Rheology Abstracts. The cost of printing and sending out Bulletins is significant, but should we give up the paper version for an E-bulletin? This is one for you, the members, to decide. (Dare I suggest a referendum?) Please let us, the Council, know your opinions and ideas.

This was Malcolm Mackley's last Council meeting, and Eirian thanked him for his contribution to the Society. Malcolm has been the Society's Foreign Secretary (or more correctly its representative on the European Society of Rheology) and has helped to organise many of the Society's scientific meetings.

Finally regular readers of the commentary will no doubt be anxious to hear the latest news of the gavel. This most elusive member of the Society finally put in a personal appearance at the start of the meeting – and after Eirian gave it a rather timid tap on the table, it was dispatched to Aberystwyth - to take its place in the cabinet.

Oliver Harlen

The 61st Annual General Meeting of the BSR

President's Report

This proved to be a fairly quiet year after the exertions of Rheology 2000. The final report of the organising committee has been presented and we note that the event had been a great success, with a final healthy balance, which I shall leave to our treasurer to present in his report. I wish to record my thanks to the organising committee led by Professor Ken Walters and Professor Peter Townsend. I would also like to pay tribute to those members of Council who had contributed to the success of Rheology 2000, namely David Binding, Nick Hudson, Mike Webster and Rhodri Williams.

The BSR owns various artefacts such as a gavel and items, which have been donated to the Society over the years. The Council (David Binding) has commissioned a local joiner to design a display case for these artefacts in the library adjacent to the Scott Blair Collection room based at the Department of Mathematics at the University of Wales Aberystwyth. It has also been decided that a terminal will be installed in the Scott Blair Collection room for on-line searching.

I am also pleased to report that several members were conferred as Honorary members this year. They include Prof. C Wolff, Prof. I.M. Ward, Dr D.R. Oliver, Dr B. Warburton, Dr G. Ajroldi, Dr A.A. Collyer and Prof. J. Kubat.

A provisional agreement has been made with the Canadian Society to offer them an electronic copy of Rheology Abstracts, upon publication of each issue. This will be a pilot scheme for the Canadians only and will run for one year, after which its success will be reviewed and, if appropriate, extended to other societies, such as the Society of Rheology. They also wish to offer the CD-ROM of the back issues of Rheology Abstracts.

The BSR were involved in various conferences this year and the first was held at the University of Plymouth. The conference titled 'Industrial food processing: experiments and numerical simulation' was held between April 9-11th 2001. The Department of Mathematics and Statistics of the University acted as host. The conference was held under the auspices of the University of Wales Institute of Non-Newtonian Fluid Mechanics and supported by the British Society of Rheology. The Biotechnology and the Biological Sciences Research Council, Engineering and Physical

Sciences Research Council, and T.A. Instruments Ltd. also supported the conference. The aim of the conference was to advance the understanding of problems that occur within the food processing industry. The central theme was food rheology, but other topics such as the development of novel numerical methods or new experimental techniques were also presented. There were 57 registrations, 15 of who were from outside the U.K and 21 from industrial companies. Prof. Charles Schumaker of the University of California, Davis, has written a report for the Bulletin and he concluded that it had been a very successful conference

With regard to the Complex Material in External Fields conference at Manchester that is taking place while this report is being produced, I would like to offer my congratulations to Andrew Masters and his committee on a well organised conference. The line up of distinguished speakers is very impressive.

The proposal for an annual meeting of the ESR has been discussed by the British Society of Rheology and the council felt that it is important that the number of meetings should be limited. The present biannual European conferences are events, which most rheologists wish to attend, in the same way that the International Congress is a priority event. We feel that setting up an annual ERC conference would compromise the standing of the European Congress as a conference, which can compete with the International events. We do not have a problem with designating conferences as European but we need to keep the reputation of the biannual European Congress. Therefore the majority of Council wish to retain the present system of alternating biannual European and International conferences with ordinary European conferences in between. The decision on this proposal will be taken at the European Congress at Erlangen in September 2002.

There will be various changes in the composition of Council for the coming year. Oliver Harlen has agreed to be nominated for Bulletin Editor in succession to Paul Doody, and Gary Tucker of CCFRA has offered to take over as Abstracts Editor from Nick Hudson. Chris Petrie had agreed to be nominated as a Council Member with responsibility for the webpage and this was agreed at the AGM. I would like to take this opportunity to thank Paul for his dedication, under difficult circumstances, and I am glad to say that the publication dates for Bulletins are now back on track. To Nick Hudson for his magnificent efforts on the Abstracts front and I am glad to say that Nick will continue

as the Publications officer. Derek Bell and Malcolm Mackley stand down as Council members under the four-year rule and I would like to thank them for their valuable perceptive contributions over the last four years.

A meeting of the webpage subcommittee has taken place and it was agreed that the Bulletin would be available electronically to members as an option. Members will be asked for their preference at the time of invoicing for their subscriptions. Also it was agreed that Rheology Abstracts should be available electronically to members on payment of their additional £15 a year. Again this would be an option. The Council wishes to be able to communicate more efficiently with our members so we have asked everybody to provide us with their email addresses.

With regard to future meetings, a joint meeting will take place between 21st and 26th April in 2002. The Spanish Society will be responsible for the local arrangements, and together with the BSR, will host the European School of Rheology. The Spanish, Portuguese, Italian and British Societies will organise the scientific meeting on Rheology for the Process Industries. The program for this meeting, to be held in Malaga, will be available shortly.

We agreed to make the Annual Award 2001 to Professor Howard Barnes for his valuable contributions to Rheology over the last 35 years. The presentation was made at the dinner following the AGM. I am indebted to Professor Rhodri Williams of the University of Wales Swansea for writing the citation, which appears in this Bulletin.

The AGM meeting in 2002 will comprise an invited lecture, followed by the AGM and a dinner. Possible speakers are being approached.

The policy of the British Society Council is to nominate the future president a year in advance, so that the next President can attend some council meetings before his period of office begins. This year I am glad to be able to report that Dr Geoff Maitland of Schlumberger Cambridge Research has agreed to be nominated for the period 2002-2004.

In conclusion I would like to take this opportunity to thank all members of Council for all their efforts during the past year.

T Eirian R Jones

Honorary Secretary's Report

My report is relatively short this year to avoid duplicating what the President has already said.

There was a scientific meeting on food and general rheology in Plymouth in April 2001 and the present joint meeting with the Royal Society of Chemistry subgroup on the theme of colloids and soft matter. We are collaborating with the Spanish, Portuguese and Italian societies in a conference on engineering rheology, to be held in Malaga in April 2002, together with the European School of Rheology. The timetable of meetings in September 2002 is rather congested so we are exploring the possibility of a part day meeting followed by the AGM rather than a full conference.

Council has met three times to manage the affairs of the Society and among the issues discussed are the following. We have been exploring the possibility of publishing an annual review of non-Newtonian fluid mechanics. We are continually looking at ways of improving our services to members through electronic service delivery and web based access to information. We have made an arrangement with the Canadian Society of Rheology to supply Rheology Abstracts electronically and are considering other specific linkages.

This year we have made the 2001 Annual Award to Howard Barnes for his work on industrially significant fluids and rheology education. We have made a couple of travel grants to students this year. We supported Jan Engmann, Cambridge, to attend the ESAFORM materials processing conference in Liege, and Haifa el Sadi, a student at Concordia University in Montreal to attend the Process Rheology course in Glasgow. We have now refined our criteria and while grants are open to students working worldwide, they are intended to allow them to present their research work at conferences and not to attend training courses and we will be requiring a copy of their paper, poster or abstract. As always, we are keen to receive more applications from students, and would like to encourage supervisors to promote the awards to their students. In the same way, it is several years since we had a Scott Blair scholar and I would like to urge supervisors to nominate their students for this award.

I would like to conclude by thanking all the Officers and Council Members who have worked hard for the Society this year, particularly mentioning Derek Bell and Malcolm Mackley who stand down at this

AGM having completed four years. I would like to say thank you to three other people, who are not currently members of Council but also do a great job on our behalf: Chris Petrie who looks after the Society's web page and has now agreed to stand for election to ensure that the connection between the Council and the web page gets even closer, John Benbow who acts as our archivist and Ken Walters who is custodian of the Scott Blair Collection.

PFG Banfill

Honorary Bulletin Editor's Report

In my report I will try and summarise the current state of play with regards to the Bulletin and provide a little perspective and advice to my successor.

1. Accounts

At the time of writing, the Bulletin cost centre is owed a total of £2740 with respect to advertisements that have appeared in Vol 42(3) and Vol 43(1,2,3). Invoices have been prepared for Vol44(1) and 44(2), but not yet sent, for a further £3800.

In addition, we have a number of unpaid invoices outstanding from earlier issues, which are currently being pursued. These amount to a total of £515.

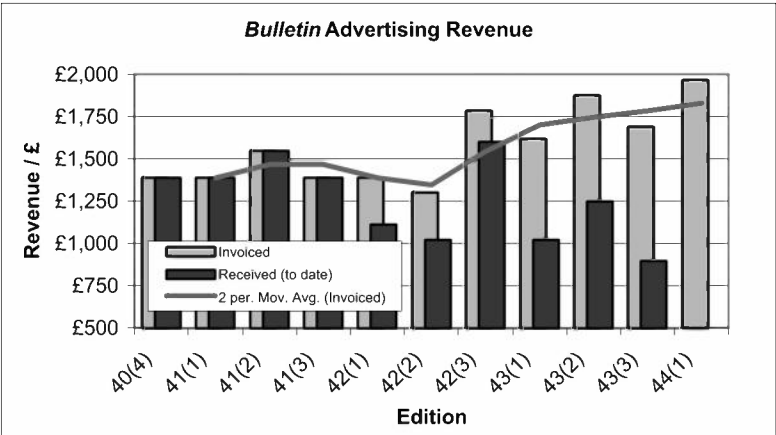


Figure 1 Advertising revenue by *Bulletin* issue

The practice of invoicing once a year in arrears for advertising was adopted as a convenience measure, but I am aware that it can cause problems for the Treasurer.

Advertising revenue is therefore healthy (averaging £1800 per edition vs. £1390 when I commenced my stint) (Figure 1).

Current advertising rates are unchanged since Nick and I revised them in 1998. It is probably worthwhile reviewing them again – especially in line with other opportunities like web links *etc* if we go for electronic publication of the Bulletin. The rates are summarised below.

Format	Bulletin of the BSR	Rheology Abstracts	Both
<i>½ page</i>	£65	£100	£150
<i>Full page</i>	£125	£200	£300
<i>Spot colour</i>	+£25 for each	+£40 for each	+£50 for each
<i>Full colour</i>	+£225 per page	+£225 per page	+£350 per page

Table 1 Advertising rates for the *Bulletin* and *Rheology Abstracts*

2. Publication Dates

We are now back on track with both 43(3) and 44(1) being published within our pre-announced months. My special thanks to Nick and Eirian for facilitating this and for their overall support.

Table 2 below shows the state of Publication dates.

Volume(Issue)	Zip file date	Publication date
40(3)	30 September 1997	Data unavailable
41(1)	17 May 1998	June 1998
41(2)	Data unavailable	
41(3)	10 March 1999	May 1999
42(1)	28 June 1999	August 1999
42(2)	21 December 1999	February 2000
42(3)	21 March 2000	April 2000
43(1)	01 August 2000	Data unavailable
43(2)	02 February 2001	March 2001
43(3)	21 February 2001	March 2001 (PDF)
44(1)	14 May 2001	20 June 2001

Table 2 Publication history of the Bulletin

It should be noted though that the **CONTENT** of the Bulletin is tailored to the actual copy date though, and the introduction of the “Ones that got away” section helps to silence the critics (a little bit anyway!).

There was always the possibility that we could combine issue to catch up but I resisted doing that as it felt like cheating... I think we have improved though!

The published publication dates, by the way, are given in Table 3.

Issue No:	Edition	Copy date	Publication target
1	European	15 April	May
2	British	15 August	September
3	European	15 December	January

Table 3 Copy and publication dates for the *Bulletin*

During the period of my editorship we also swapped covers and I took the opportunity to upgrade the style of the Bulletin – and add colour! Although the financial implications of full colour have been discussed before, it has allowed us to earn extra revenue through the use of full colour adverts.

3. Summary

I hope the above is useful for the Society. I will be contacting my successor so that we can arrange a joint session for a smooth handover.

All the best

Paul Doody

Honorary Abstract Editor's Report (including Publications Manager's Statement)

This is my final AGM as Honorary Editor, and I would like to express my thanks to the small band of Abstractors who have kept me constantly supplied over the last four years. Between us, we have raised the number of abstracts presented each year from around 2000 to just over 3500, and have managed to cut the lead time between publication in a journal and the appearance in the Abstracts. Indeed, in the soon to be published Volume 44 issue 3, there are abstracts whose publication date is September 2001! (Many journals manage to produce issues well ahead of their headline date, whilst others are still about 2 years behind - such as

Biorheology!). We have seen a steady increase in the number of papers containing aspects of rheology published each year. By using a long string of keywords - including rheology -connected with AND, OR, and NOT, I have managed to determine a good estimate (over 5500) of the total number held on databases such as ISI and WoS. Mentioning these leads me on to the future of the Abstracts. Most academics and many in larger companies have access to these databases (for which their institution pays large annual sums), and so see no need for a hard copy of the Abstracts (even so, they are invaluable for whiling away the time waiting in airport lounges or on trains!). However, whilst some members still request them in that form, we will still endeavour to produce it. I wish my successor every success, and trust that he will enjoy it as much as I have. I certainly know a lot more about certain aspects of rheology than I did 4 years ago!

Putting on my other hat, as Publications Manager, I have made considerable efforts to raise income and reduce costs. As regards the Abstracts, we have managed to slow down the rate of loss of customers that was approaching freefall when we took over from Elsevier. We have kept the same pricing structure for the last 6 years, whilst managing to produce nearly twice the number of pages and having a full colour cover (the print has got smaller, and some of our Honorary members are having to use magnifying glasses). Both Abstracts and Bulletin are printed at the University of Strathclyde, and as newer and more sophisticated equipment is commissioned, we have managed to reduce turn round time and keep unit costs stable (I keep threatening them with quotations from other firms). We have produced one European edition of the Bulletin as a PDF for electronic transmission, and plan to offer this format to members in the new year. It will also appear on our website, certain portions being only accessible by our members. The Abstracts will also be going down this route, both to our members who pay for it, and for the institutions who pay their annual fee (and provide the main income for production). Issues will also be available on CDROM, which is cheaper to produce, and post, than a hard copy version.

Nick Hudson

CITATION FOR THE ANNUAL AWARD OF THE BSR HOWARD A BARNES, O.B.E.

Howard Barnes needs no introduction to rheologists: indeed, with his distinguished co-authors, he has written his own *'Introduction to Rheology'* surely the best-selling book ever published on the subject, with nearly 5000 copies sold to date.

Howard graduated in Physics at Aberystwyth and obtained his Ph.D. there in Applied Mathematics, later joining Unilever Research at their Port Sunlight Laboratory where he is now a Principal Scientist. During his career he has combined the role of an industrial scientist with that of a highly successful researcher whose publication record is the envy of many academics. His specialism is rheology but an important aspect of his success has been his ability to maintain the breadth of process engineering knowledge, which enables him to relate rheology to the work of the diverse groups and activities around him.

His publications include nearly 60 papers, books and articles and the extent of his contributions to the literature, which include several publications in *Nature* and the *Proceedings of the Royal Society*, is truly impressive. We can gain an impression of the breadth of his work by noting that he has published in the areas of Rheometry, Suspension rheology, Mathematical aspects of Heat Transfer in Rheology and Theoretical and Experimental aspects of extensional flows.

One of his first contributions to rheometry involved a device for the measurement of the viscosity of blood; and few of us will need to be reminded that Howard was an early and enthusiastic adopter of the controlled stress technique, which led to his celebrated paper on the 'yield stress myth' with Ken Walters. Such was the interest which that paper stimulated that some of us will remember it even led to a vote being taken at a BSR meeting (at Reading in 1985) in which members of the audience were asked to raise their hands if they believed in the existence of a 'true' yield stress! Not content with investigating the extensional properties of polymer solutions and suspensions, he has recently reported on 'The non-linear viscoelastic behaviour of human hair at moderate extensions'! (a subject which, as we can see, he has an enduring, if waning, interest).

This is by no means an exhaustive list and we note that some of his publications have drawn accolades from his colleagues and peers: they

include his paper '*Rheology for the Chemical Engineer*' which was judged the best article in *The Chemical Engineer* in 1993, and won the IChemE's Hanson Medal. Earlier, in 1980, he was appointed the first UK Royal Society of Chemistry Industrial Fellow and surveyed Dispersion Rheology in the UK. The resulting book - "*Dispersion Rheology: 1980 - A survey of industrial problems and academic progress*" led to the conferment of the Royal Society of Chemistry's 1984 Award for Solids and Materials Processing.



Professor Barnes receives his award from BSR president Professor Eirian Jones

It is further testimony to Howard's breadth as a scientist that he has been granted 3 patents, including one for a 'Powder Aerosol Actuator', another relating to the use of Spray Droplets in Cleaning and another involving the acoustic properties of gas bubbles. In between his entrepreneurial activities, his research and his writing, he has found time to serve as a visiting professor at two universities - Aberystwyth in Applied Mathematics and Liverpool in Mechanical Engineering and has examined many PhD's. His reputation as a scrupulously thorough but always fair examiner is known to many in this room; and many of us have been impressed by his ability to frighten PhD supervisors whilst simultaneously putting the candidate at ease.

Among the most highly valued of Howard's contributions to the rheological literature include a series of scholarly and comprehensive reviews on subjects as wide ranging as thixotropy, yield stress, dilatancy, on-line viscometry, rheology of emulsions and wall depletion (slip). These substantial publications represent a particularly valuable resource to the emerging generation of rheologists, to whom they can be commended unreservedly.

They also serve as testament to the role he has established as one of rheology's best communicators and educators. The diplomats and ambassadors of this world commonly reap the reward of honours – in his turn, as an ambassador for our science among other scientists and engineers, Howard has deservedly been honoured by the Queen with the award of the OBE. His other awards include a D.Sc. from the University of Wales and he is a Fellow of the Royal Academy of Engineering, the Institute of Materials and the I.Chem.E. We are proud, in our turn, to be able to present this eminent and distinguished rheologist, and a Past President of our Society, with its Annual Award.

P Rhodri Williams

AIMS OF THE SOCIETY

The way liquids flow and solids deform affects all aspects of life.

Extraction and processing of crude oil, moulding of plastics, use of toothpaste, spreading of margarine, painting and the lubrication of joints in the human body are all examples of processes depending upon rheological behaviour. Rheology is defined as the science of the deformation and flow of matter.

If your work is concerned with rheology in any way, then you have much to gain by joining the British Society of Rheology - publications, conferences and access to fellow members who, while working in a different discipline or industry, may be facing similar problems to yours.

The Society is non-profit making and is registered as a charity.

CONFERENCE REPORTS

Industrial Food Processing: Experiments and Numerical Simulation Plymouth, UK, 9-11 April 2001

The conference “Industrial Food Processing: Experiments and Numerical Simulation” was held on April 9th – 11th at the University of Plymouth, UK. The conference was hosted by the Department of Mathematics and Statistics and organised by Professor T.E.R. Jones. The conference was held under the auspices of the University of Wales Institute of Non-Newtonian Fluid Mechanics and supported by the British Society of Rheology. The Biotechnology and the Biological Sciences Research Council, Engineering and Physical Sciences Research Council, and T A Instruments Ltd also supported the conference.

The aim of the conference was to advance the understanding of problems that occur within the food processing industry. The central theme was food rheology, but other topics such as the development of novel numerical methods or new experimental techniques were also presented. There were 57 registrations, 15 of who were from outside the U.K. There were 21 who were from industrial companies.

The conference began with a session titled “Rheological Challenges.” Three prominent speakers from the food industry presented viewpoints on the challenges that faced food rheologists. Howard Barnes discussed the steps important in controlling food texture in the manufacture of food products. A key concept, which must be understood, is the consumer’s view of texture as compare to flavour and colour. Dr. E. Roberts continued with a presentation about the need for novel rheometry techniques for process rheometry in the food industry. He discussed in-line and on-line process measurements and the challenges of food processing such as the need for sanitation and food as a low cost material. Dr. A. S. Burbidge completed the opening session with a presentation about modelling of concentrated food systems. He discussed challenges and problems in developing models. He concluded that complete models for complex foods are not possible now and development of full constitutive equations is unlikely. In the development of partial models, the choice depends on the rheological questions that are the most important to answer. Both Barnes and

Burbidge commented on the importance of extensional properties with respect to sensory texture.

The second session addressed squeeze film flow from an experimental viewpoint. The use of magnetic resonance imaging (MRI) for a three dimensional visualization of complex flows was presented. The use of MRI for measurement of temperature and the combination of complex flows and temperature distributions was presented. In contrast to the use of a complex technique such as MRI, the value of simple compressions of solid like foods was presented. This technique was further expanded in the last presentation with the development of a sensor for the measurement of the radial pressure distribution during the compression of materials between parallel plates.

Tuesday morning, the third and fourth session focused on modelling. The third session began with a presentation from POLYFLOW concerning the use of numerical simulations of flow in the design of a food mixer. The mesh superposition technique was introduced that provides a convenient way to model intermeshing parts in extruders or mixers without involving any remeshing complexity. It generates separate meshes for the solid and liquid phases and provides a method of generating a library of scalable of moving parts that can shorten the development of new simulations. This talk was followed with a presentation by Professor Binding concerning the development of model mixer used in an experimental study of the peeling of dough from the solid surfaces of the mixer. Using flow visualization with this model system, conditions for peeling which investigated. The session was continued with another presentation concerning dough-mixing flows. Professor M. Webster discussed a finite element simulation of industrial dough mixing. Various types of fluid models were incorporated of either Newtonian or inelastic models with shear rate dependent viscosity. The results showed good agreement between experiment and numerical simulation. The session was concluded with the second edition of the rheology film made at Aberystwyth with narration by Professor K. Walters. The fourth session continued with modelling but included heat and moisture transfer as well as flow. Dr. R. Anderssen from CSIRO of Australia discussed the drying of food doughs as modelled with a four-phase model for the drying of pasta. The four phases were related to four phases in the movement of moisture during the drying process. The next presentation by Dr. C. Duchanoy from Unilever Research discussed the

problems of the modelling of the thermal treatment of liquids containing particulates for the production of commercial safe food products. Numerical simulation tools based on CFD were developed to understand how heat transfers during the flow of these solid-liquid mixtures. Residence times and heat transfer characteristics of the solid phases were analysed in the case of a flow in a hair-pin shaped bend. That configuration was chosen because it is relevant for the understanding and design of tubular heat exchangers. The last talk was by Dr. U. Bolmstedt of Tetra Pak. The subject was heat transfer and flow behaviour modelling in heat exchangers. A software model called TPCOSS was presented that was based on the MATLAB and the MS EXCEL software. With this software any desired particulate continuous process line can be simulated.

Tuesday afternoon three more talks on modelling and two on food biopolymers and rheology were presented. The processing and cooling times of a tomato product were optimised with an end-over-end jar rotation during thermal processing. Dr. G. Tucker of Campden and Chorleywood Food Research Association used visualization studies of the headspace bubble during jar rotation with different starch solutions to simulate the tomato products. The coupling of these experiments with CDF studies provided data for optimising the jar rotation rate for lower processing times. Dr. M. Vandenberghe from FMC discussed the effect of different types of agitation in axially rotated cans. These types included slow continuous rolling, discontinuous axial rotation, and intermittent agitation. This was followed by a comparison of in-container mixing in axial and end-over-end rotations by Dr. J Hughes of the University of Plymouth. A series of experiments and numerical simulations of the flow of Newtonian and non-Newtonian fluids in rotating cans were described. The flow conditions in which the heating time was reduced correlated well to the conditions in which the liquid-phase median shear rate was maximized in isothermal flow. There was little difference in the overall trends in heating times between rotation about a horizontal axis of symmetry and end over end rotation. The final two talks on Tuesday afternoon focused on food biopolymers. Dr. G. Brownsey from the Institute of Food Research at Norwich provided "A View from the Bulk to the Interface" with regard to food biopolymer. In addition to rheology other functional properties of biopolymers were discussed with regard to the structure and texture that they provide in foods. Professor J. Maia presented a study on the rheological and

thermal behaviour of stirred yoghurt. There were two different zones of temperature dependence, with a temperature transition between 20 and 25°C. With this result and others, it was postulated that the flow in the heat exchangers is laminar and there may exist a non-developed limiting boundary layer.

On the final morning of the conference two sessions were held. Rheometry and Food Product Rheology were the subjects. Professor C. Shoemaker presented the use of swallow channel screw as a rheometer. As a fundamental instrument, this rheometer was accurate in measuring viscosities of Newtonian fluids. For power-law fluids, measured power law coefficients were 20% lower than values obtained from cone and plate rheometers. Professor M. Barrow proposed the novel use of an Atomic Force Microscope for the evaluation of the tensile properties of complex fluids on a nanoscale. Good correlations were found between this method and macroscale studies with a newly developed version of a Bullet-Piston apparatus. Professor C. O'Donnell discussed the evaluations of six different process viscometers for food sauce processing. Dr. C. Servais from Nestle Research Centre discussed the problem in the rheological characterization of the microstructure of foods. The experimental problems were discussed as well as techniques that would avoid these limitations. In the last session, Professor C. Gallegos presented a comprehensive discussion of the rheology of processed tomato products. The effect of various processing factors on tomato product consistency was presented. Ms. C. Tudorica, Ph. D. candidate, discussed the effect of adding beta-glucan to dairy and pasta products. Positive correlations were reported and SEM micrographs showing the inclusion of the beta-glucans in the products structure were presented. In the final presentation of the conference Dr. M. Leser from the Nestle Research Centre discussed the rheology of cubic phase systems that were microemulsions or micellar in nature. The use of monoglycerides in formulating these systems and the effect of concentration was discussed. These cubic phases were found to behave as Maxwell fluids.

The attendees also had time during lunches and two dinners for extended discussions. Overall the conference was judged to be very successful.

Prof Charles Shoemaker
University of California, Davis



NEWS FROM OTHER SOCIETIES

GROUPE FRANÇAIS DE RHEOLOGIE (GFR)

36th Annual Meeting: Rheology - Civil Engineering and Environment

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International Delegate :

Jacques Bouton

RHEO

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91160 Champlan

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Télécopieur : +33 (0)1 64 54 01 87

jacques.bouton@thermorheo.com

Website :

<http://www.univ-lemans.fr/sciences/wgfr>

The 36th Annual Meeting of GFR will take place in Marne la Vallée from the 10th to the 12th of October 2001. The general topic is "Rheology - Civil engineering and Environment". 70 oral and poster communications will be presented organized around the five following topics :

- Behaviour and internal structure
- Segregation and mixing
- Visualization of flow or internal structure
- Numerical simulation
- Processing

These sessions will be introduced by invited speakers :

- H. Van Damme (ESPCI, Paris): "Granular pastes : the art of contact"
- D. Bonn (ENS, Paris): "Aging and Rejuvenation under shear of glass and colloidal gels"
- R. Höhler (MLV University): "Rheology of aqueous foams"
- B Herzhaft (IFP, Rueil): "Drilling and cementing fluids: examples of complex industrial materials"

Detailed information concerning the program and inscription (before 10 September) may be found on the web site of the congress: www.enpc.fr/GFR2001/



1st International School of Rheology in French

The first International School of Rheology in French will take place during the two days preceding the congress on the following subjects :

- 8 October: Granular materials and rheology

- 9 October: Techniques of exploration and rheology (NMR, RX, SANS, etc)

Information concerning this school are also available on the web site of the congress.

For any further information on these two events please contact:

Philippe Coussot, LMSGC, 2 Allée Kepler, 77420 Champs-sur-Marne, France.

T: +33 1 40 43 65 41

F: + 33 1 40 43 54 85

Président:

Patrice Flaud

LBHP T33-34 E2

2 Place Jussieu - Case 7056

75005 Paris

Tel : +33 (0)01 44 27 43 33

Fax : + 33 (0)01 44 27 43 35

pflaud@ccr.jussieu.fr

Secretary:

Jean-Louis Doublier

INRA-LPCM

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Téléphone : : +33 (0)2 40 67 50 55

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Treasurer:

Francisco Chinesta

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Website :

<http://www.univ-lemans.fr/sciences/wqfr>

Jacques BOUTON

GFR International Delegate

OTHER RHEOLOGICAL ANNOUNCEMENTS

Rheology of Dispersions
A meeting organised by the
SCI Colloid and Surface Chemistry Group
7 November 2001
SCI London, UK

- | | |
|--------------|---|
| 09:30 | Registration and Coffee |
| 10:00 | Prof. Jan Mewis, Leuven, Belgium Introduction: The rheological features of colloidal dispersions |
| 10:45 | Dr Richard Buscall, ICI, UK Polymer solutions and Colloidal suspensions compared |
| 11:30 | Prof David Heyes, Surrey University, UK Simulating the effects of colloidal interactions and ageing on dispersion rheology |
| 12:15 | Lunch |
| 13:30 | Dr Bill Frith, Unilever, UK Visualising flows in a suspension of soft particles using MRI |
| 14:15 | Dr Rob English, NEWI, UK Controlling rheology with associating polymers |
| 15:00 | Tea |
| 15:30 | Prof Tharwat Tadros, Consultant, UK Polymer-colloid mixtures |
| 16:15 | Prof Brian Briscoe, Imperial College, UK Highly-concentrated dispersions and pastes |
| 17:00 | Close of Proceedings |

Colloidal dispersions are important to a wide range of industries. The rheological properties of dispersions affect manufacturability and end-use.

The rheology of a formulation also gives an indication of the colloidal state and interactions.

This meeting will be of interest to colloid scientists who want to learn more about rheology and also formulators and industrialists who wish to learn more about product-process interactions.

REGISTRATION FORM

Rheology of Dispersions

Non-members	£130	SCI/RSC/BSR/BCC members	£80
Non-member students	£40	SCI/RSC/BSR/BCC students	£30
		Retired members	£40

Please send SCI membership details

FEE: Includes refreshments as stated in the programme.

Signature:.....Date

Please register me for the above conference

SURNAME TITLE

FIRST NAME INITIALS

POSITION

ORGANISATION.....

ADDRESS

.....

..... POSTCODE.....

TEL: FAX:

EMAIL:

Special requirements: dietary / access / other

.....

**The
University of Wales
Institute of Non-Newtonian Fluid Mechanics**

is pleased to announce its
ANNUAL PUBLIC LECTURE

*to be held in Room 321,
Department of Mathematics
University of Wales Aberystwyth*

at 3:30 pm Thursday, 18th October 2001

**"VISCOPLASTIC MATERIALS EASY FLOW WITH
WALL ULTRASONIC LONGITUDINAL MOTION"**

to be presented by:

Professor JEAN-MICHEL PIAU

Université Joseph Fourier, Grenoble

Tea will be available beforehand.

Dr. David M Binding
Department of Mathematics
University of Wales Aberystwyth
Ceredigion, SY23 3BZ, UK

T: +44 (0)1970 622775

F: +44 (0)1970 622777

E: dmb@aber.ac.uk

<http://www.appliedrheology.co.uk>

http://users.aber.ac.uk/dmb/hp_dmb.html

**UNIVERSITY OF WALES
INSTITUTE OF NON-NEWTONIAN FLUID MECHANICS**

**CONFERENCE ON PROCESS MODELLING
Lake Vyrnwy Hotel, Powys, Mid-Wales
March 25 – 27, 2002**

Programme

The conference will commence at 12 noon on Monday March 25th, 2002 and finish at lunchtime on March 27th, 2002.

The two day period gives time for workshop sessions as well as formal lectures. The emphasis will be on the numerical simulation of industrial processes involving non-Newtonian fluids.

Plenary speakers include Prof F P T Baaijens (Eindhoven), Prof D G Baird (Virginia Tech), Prof H A Barnes (Unilever), Prof D V Boger (Melbourne), Prof R Bowen (Swansea), Prof J de C Christiansen (Aalborg), Dr B Debbaut (Polyflow), Prof R Keunings (Louvain la Neuve) and Prof O Manero (Mexico).

Venue

The meeting will be held at the Lake Vyrnwy Hotel, which is situated in a magnificent 24,000 acre country estate near the village of Llanwddyn in Mid-Wales, with spectacular views of Lake Vyrnwy. The hotel offers excellent accommodation with full conference facilities.

Costs

The total cost of £350 includes full board accommodation from Monday lunch to Wednesday breakfast. An accompanying person, sharing a room with a conference delegate, will be required to pay £115 or £130, depending on whether Tuesday lunch is required.

Organizing Committee

Professor Ken Walters FRS (kew@aber.ac.uk)

Dr G W Roberts (g.w.roberts@bangor.ac.uk)

Professor M F Webster (m.f.webster@swan.ac.uk)

Professor T N Phillips (tnp@aber.ac.uk)

**UNIVERSITY OF WALES
INSTITUTE OF NON-NEWTONIAN FLUID MECHANICS**

**CONFERENCE ON PROCESS MODELLING
Lake Vyrnwy Hotel, Powys, Mid-Wales
March 25 – 27, 2002**

Please return this form no later than 16th February, 2002. Prospective speakers should return this form, together with a 200 word Abstract, no later than January 12th, 2002.

Block letters throughout please

Title.....
Surname.....
Forename(s).....
Organization.....
Full address.....
.....

Tel Fax
Email

- I wish to attend the conference and I enclose a cheque for £350 made payable to the University of Wales Institute of Non-Newtonian Fluid Mechanics.
- I shall be accompanied by and I enclose a cheque for £115/£130 made payable to the University of Wales Institute of Non-Newtonian Fluid Mechanics.
- I wish to present a paper and I enclose an Abstract.

Please return this form to:

Dr G W Roberts
Institute of Non-Newtonian Fluid Mechanics
School of Informatics
University of Wales, Bangor
Gwynedd LL54 7UF

T: 01248 382480/382475
F: 01248 355881
E: g.w.roberts@bangor.ac.uk

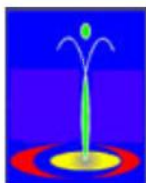
8th European School on Rheology



Torremolinos - Málaga (Spain)
April 21-24, 2002

Rheology for the Process Industries

Organised by



The European Society of Rheology



Grupo Español de Reología

The British Society of Rheology



Directed by:

Prof. Crispulo Gallegos
c.gallego@uhu.es
Universidad de Huelva

Dr. Nicholas E. Hudson
n.e.hudson@strath.ac.uk
University of Strathclyde

School Fee

750.00 Euros

A limited number of scholarships will be available (50% reduction in the regular fee).

Course

The length of course will be 30 hours

Faculty
(provisional)

Prof. H.A. Barnes, Unilever, UK
Prof. C. Gallegos, University of Huelva
Dr. N.E. Hudson, University of Strathclyde
Prof. J. Mewis, Katholieke Universiteit Leuven
Prof. J.M. Piau, University of Grenoble
Prof M.H. Wagner, Technical University of Berlin
Prof. K. Walters, University of Wales
Prof. H.H. Winter, University of Massachusetts

Contact address:

Prof. C. Gallegos
Universidad de Huelva
europeschool@uhu.es

Eurorheo 2002-01



Torremolinos - Málaga (Spain)
April 24-26, 2002

*Joint Meeting of British, Italian, Portuguese and
Spanish Rheologists*

Organised by

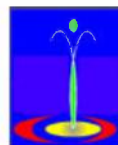


The European Society of Rheology

Grupo Español de Reología



Sociedade Portuguesa de Reologia



Società Italiana di Reologia

S.I.R.



The British Society of Rheology

Local Committee

The Rheology Group of the Universities of Huelva and Sevilla hosts the meeting

Co-chairmen

Prof. Antonio Guerrero
aguerrero@us.es
Universidad de Sevilla

Prof. José Muñoz
jmunoz@us.es
Universidad de Sevilla

Conference
Topics

Constitutive Equations, Theory and Molecular Theories
Electro and Magnetorheology
Fluid Mechanics and Numerical Simulation
Food Rheology and Biorheology
Industrial Rheology
Polymer Rheology and Processing
Rheometry, Experimental Methods and Instrumentation
Suspensions, Emulsions and Foams, Gels

Contact address:

Eurorheo2002-01
Departamento de Ingeniería Química
Universidad de Sevilla
c/ P. García González s/n 41012 Sevilla
Tlf.: +34 95455 7179; Fax: +34 95455 7134
<http://www2.uhu.es/eurorheo>
eurorheo2002-01@uhu.es

BSR MEMBERSHIP NEWS

RECRUITMENT OPPORTUNITIES

A range of opportunities may be found at <http://www.bsr.org.uk/>

For example:

Ph.D. and Post-Doc Positions

The Institute of Polymer Materials at the University of Erlangen-Nuernberg (Germany) offers the opportunity to perform research as a Ph.D. student or a Post-Doc on a number of projects dealing with the fundamentals of polymer science as well as with the development of new applications for polymer materials. The following five open positions sponsored by the organisations given in brackets are offered:

- Antimicrobial polymers (European Community)
- Thermoplastic polymers with magnetic properties (German Research Foundation)
- Flexible circuit boards based on high temperature resistant thermoplastics (German Research Foundation)
- Precursor derived ceramics (German Research Foundation)
- Modelling of rheological properties of polymer melts (Internal source)

All positions are available for material scientists, physicists, chemists, mechanical or chemical engineers, who are interested in interdisciplinary research and who would like to work at an internationally oriented Institute.

Positions with an attractive payment up to a gross salary of 40 000 Euro per year according to BAT (German salary system) are offered.

Interested ?

Please send your application including your curriculum vitae and certificates to:

Prof. Dr. H. Muenstedt Institute of Polymer Materials Martensstr. 7 D-91058 Erlangen, Germany E: polymer@www.uni-erlangen.de F: +49-9131-8528321	Contact Person: Jochen Bauer (Dipl.-Ing.) E: jochen.bauer@www.uni-erlangen.de T: ++49-9131-8527734
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For more information about the Institute please visit our website:
www.lsp.uni-erlangen.de

INDUSTRY NEWS

TA INSTRUMENTS AR2000

The new AR 2000 Mobius™ drive system delivers controlled rate / stress relaxation capability comparable with dedicated controlled rate rheometers, without compromising its legendary performance in controlled stress measurements. Mobius allows the rheologist to focus on testing for performance and system response (real world situations), since the AR 2000 automatically engages the drive as required by the experimental conditions. This flexibility is valuable and cost-effective in a busy research laboratory, since high performance measurements in either mode are now possible.

The Mobius™ drive system incorporates an ultra-low inertia motor and triple air bearing, coupled with a 2,000,000: 1 torque range, and high-speed electronics. This permits rapid response and tracking of changes in speed or position commands necessary for high performance controlled rate measurements. In stress relaxation experiments, the large torque range of Mobius™ actually improves upon data from dedicated controlled rate devices. It not only reaches the set strain in a comparable time, but also extends the $G(t)$ data well beyond the time where data from the latter would become too noisy for accurate measurements.

The Mobius™ Drive system when combined with powerful, yet easy-to-use Rheology Advantage software, and unique Smart Swap™ interchangeable temperature control systems, makes the AR 2000 the most complete research rheometer commercially available.

BOHLIN INSTRUMENTS EXPANDS GERMAN OPERATION AND ANNOUNCES 25% REVENUE GROWTH IN 2000

Bohlin Instruments, Cirencester UK, has expanded its German sales and service operation, which is located in Pforzheim near Stuttgart, by approximately 40% to a total of 700 square metres. The expansion follows as a result of strong demand in the European markets for the new Bohlin C-VOR rotational rheometer as well as the Rosand capillary products, which Bohlin acquired in late 2000. The enlarged facility includes extensive demonstration and applications testing laboratories as well as new conference and training facilities.

Bohlin Instruments, which also has direct service and sales facilities in North America and France, experienced a revenue growth of 25% in 2000.

Bohlin's group managing director, Dr Richard Hall, commented: "Last year Bohlin saw strong demand for its products across most of the markets within which we operate. This year, demand has further strengthened, mainly as a result of an aggressive product development strategy and the full effect of the acquisition of the Rosand capillary products. We believe that this success puts Bohlin at the forefront of mainstream rheology instrument suppliers in terms of both technology and growth."

RHEOMETRIC SCIENTIFIC TO BE LISTED ON THE AMERICAN STOCK EXCHANGE

PISCATAWAY, NJ - August 30, 2001 - Rheometric Scientific, Inc. (OTCBB: RHEM), today announced it has been approved for listing on the American Stock Exchange, and expects its common stock will begin trading there on September 5, 2001 under the ticker, "RHM".

Rheometric Scientific, founded in 1970, develops, manufactures, markets and services rheological (a science dealing with the deformation and flow of matter) and thermal analysis instrument systems, on-line rheological sensors, and integrated systems for research, product development, process control and quality assurance, principally within the petrochemical industry, academic and government laboratories, and the food, pharmaceutical, biotechnology, and semiconductor industries worldwide. The Company also markets and services a complete line of instruments dealing with protein characterization for the proteomics industry. The Company also provides laboratory services for material and biomolecular characterization. The Company serves an international market of Fortune 1000 and other leading domestic and international corporations, independent research and academic institutions, and government agencies from its headquarters in Piscataway, New Jersey and operations in the United Kingdom, Germany, France, Italy and Japan. The Company has an installed base of over 10,000 instruments.

THERMO HAAKE NEWSLETTER

Thermo Haake has an international newsletter, which is published periodically. It presents the latest applications, tips & tricks, information from other countries and some product news. If you want to subscribe to this newsletter, please send your email address and country to newsletter@thermohaake.com or register online for direct download.

NEW DISPOSABLE SAMPLE CHAMBERS FOR VISCOSITY TESTING

Brookfield Engineering Laboratories, Inc., the world leader in Rheometer and Viscometer instrumentation, announces new Disposable Chambers for the Brookfield Small Sample Adapter, the number one accessory purchased by Brookfield customers. These chambers are ideal for use with materials that are difficult to clean or in busy laboratories where a low cost disposable chamber will improve productivity.

Simply take the viscosity measurement, lift out the disposable chamber and load the next sample. In addition to avoiding an unpleasant, time consuming job, disposable chambers also eliminate the possibility of sample contamination.

Brookfield customers can purchase a retrofit kit that comes equipped with a water jacket, insulating cap, a box of 100 disposable chambers and a convenient carrying case. Additional disposable chambers are available in packages of 100 from Brookfield or through Brookfield dealers.

Typical applications for disposable chambers include resins, candies, chocolates, chemical compounds, highly viscous materials, and other sticky products.

STABLE MICRO SYSTEMS BREAKING DOWN!

Stable Micro Systems, one of the world's leading providers of texture analysis equipment, has announced the launch of a new test cell designed to examine structural breakdown. The Multiple Extrusion Cell measures the consistency of solid or semi-solid samples during a test that mimics manufacturing stress or mastication in the mouth. This gives the user valuable information regarding the quality of the final product,

processing conditions and/or product texture perception during mastication.

Manufacturers from all sectors of the food industry, including pasta, meat, cheese, fats, ice cream and bakery products, stand to gain qualitative benefits from the Multiple Extrusion Cell. They can, for example, evaluate the rate and extent of the work softening of butter, which affects the texture of the finished product, or determine how easy it will be to chew a meat snack. Where high force and / or excessive time is needed to break the product down, it may be desirable to alter the recipe or production process.

Originally developed by the Food Science and Technology Department at TNO Nutrition and Food Research Institute, and further optimised by Stable Micro Systems the Multiple Extrusion Cell addresses the shortcomings of previous test methods, which were either non-continuous (e.g. using a Kramer shear cell) or which allowed samples to slip or stick during the procedure.

The Cell consists of two cylinders, which fit inside each other and are fixed to the base of Stable Micro Systems' TA.XT2i and TA.HDi texture analysers. The sample is placed in the inner cylinder, into which the piston, which has a flat, circular base, is inserted. The top of the inner cylinder is then sealed by a plug to prevent leakage. The space between the two cylinders is used to circulate water, which maintains a consistent temperature, ensuring accuracy. During the test, the piston moves up and down through a number of cycles; distance, force, speed or time can be decided by the user.

PREMIUM PRESSURE TRANSDUCER SERIES OFFERS HIGH ACCURACY IN HARSH EXTRUSION APPLICATIONS

At Plastics USA, Dynisco Instruments is featuring a premium series of high accuracy, melt pressure transducers designed to provide precise pressure measurement in harsh extrusion applications. The DLX Series features an Inconel sensing diaphragm to ensure long operating life in the most abrasive and corrosive processing environments. A special titanium nitride coating on the transducer threads provides excellent protection against damage caused by galling. All DLX models carry a

three-year, extended product warranty and include a certificate for a free transducer calibration.

The DLX Series is available in a choice of rigid and flexible stem models for easy installation and removal, and an integral thermocouple model that allows simultaneous measurement of pressure and temperature at a single point. All models feature a standard, 3.33 mV/V low-level output at ranges from 0-500 psi to 0-30,000 psi. An internal 80% shunt calibration simplifies transducer set-up. Measurement accuracy of 0.25% and superior thermal stability and repeatability characteristics make the DLX Series the ideal choice for pressure control along the extruder barrel, adapter, die or wherever precise process measurement at a wide range of process temperatures is required. The Dynisco DLX Series is CE approved for compliance with international standards.

Dynisco, LLC is a worldwide leader providing pressure and temperature sensors and instruments for plastics processing and other industrial applications; polymer test systems for laboratory and in-process measurement; and gear pumps, screen changers and other auxiliary equipment for the plastics and process industries.

CAMTEL LTD TAKES ON ADDITIONAL PERSONNEL

Camtel Ltd recently (April 2001) announced the addition of Colin Smith as Production Manager to its staff at the Royston Office. Colin has been appointed to oversee all the manufacture of the Interfacial Rheometer and Tensiometer Series at our Royston office.

Colin comes with a wealth of experience in mechanical engineering and the Camtel product line and is a welcome addition to the team. He will also be taking charge of the overall servicing of the instruments along with Carole Moules and Peter Finlay (PF Consultants).

CONFERENCES

You are also advised to visit the BSR home pages where an extensive list of conferences is maintained by Chris Petrie: <http://www.bsr.org.uk/>

2001	
8-10 Oct Marne-la- vallee FR	36TH COLLOQUIUM OF THE GROUPE FRANÇAIS DE RHEOLOGIE – «RHEOLOGIE – GENIE CIVIL ET ENVIRONNEMENT» Contact Dr P Coussot, Laboratoire des Materiaux et des Structures du Genie Civil (LCPC/CNRS), Cite Descartes, 2 alle Kepler, 77420 Champs-sur-Marne, France T: +33 (0)1 40 43 50 00 F: +33 (0)1 40 43 54 50 E: philippe.coussot@lcpc.fr
21-25 Oct Bethesda, ML US	73RD ANNUAL MEETING OF THE SOCIETY OF RHEOLOGY Info: www.rheology.org/sor/annual_meeting/2001Oct
7 Nov London GB	RHEOLOGY OF DISPERSIONS A meeting organised by the SCI Colloid and Surface Chemistry Group SCI Conference Secretariat, SCI, 14/15 Belgrave Square, London SW1X 8PS T: +44 (0)20 7598 1564 F: +44 (0)20 7235 7743 E: alex.jennings@soci.org Info: www.soci.org
2002	
25-27 Mar Powys GB	LAKE VYRNWY CONFERENCE ON PROCESS MODELLING Dr G W Roberts, Institute of Non-Newtonian Fluid Mechanics, School of Informatics, University of Wales, Bangor, Gwynedd LL54 7UF, UK T: +44 (0)1248 382480/382475 F: +44 (0)1248 355881 E: g.w.roberts@bangor.ac.uk
24-26 Apr Malaga Spain	EURORHEO 2002-01 Departamento de Ingeniera Quimica, Universidad de Sevilla, c/P Garcia González, s/n 41012 Sevilla, Spain T: +34 95455 7179 F: +34 95455 7134 E: eurorheo2002-01@uhu.es Info: www2.uhu.es/eurorheo
16-20 Jun Guimaraes PT	PPS-18 – THE 18TH ANNUAL MEETING OF THE POLYMER PROCESSING SOCIETY Info: http://www.dep.uminho.pt/pps18
T: Telephone; F: Facsimile; E: Email; Info: WWW URL	

COURSES

2001	
16-18 Oct Daventry GB	APPLIED RHEOLOGY SYMPOSIUM TA Instruments, Europe House, Bilton Centre, Cleeve Road, Leatherhead, KT22 7BR T: +44 (0)1372 360363 F: +44 (0)1372 360135 E: info@taeurope.co.uk
23-24 Oct Malmö SE	GRUNDKURS I REOLOGI (BASIC RHEOLOGY, PART 1 – held in Swedish) Presented by Annika Sahlström, MSc Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
12-16 Nov Glasgow GB	PROCESS RHEOLOGY Dr N E Hudson, Dept of Pure & Applied Chemistry, University of Strathclyde, 295 Cathedral St, Glasgow G1 1XL, UK T: +44 141 548 2162 F: +44 141 548 4822 E: n.e.hudson@strath.ac.uk
6-7 Nov Malmö SE	APPLIED RHEOLOGY FOR THE PROCESS INDUSTRIES Presented by Prof Howard Barnes Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
12-13 Nov Malmö SE	WETTING, SPREADING & ADHESION Presented by Prof Tharwat Tadros Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
19-20 Nov Malmö SE	EMULSION SCIENCE & TECHNOLOGY Presented by Prof Tharwat Tadros Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
21-22 Nov Malmö SE	NANOEMULSIONS & MICROEMULSIONS Presented by Prof Tharwat Tadros Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se

2001	
26-27 Nov Malmö SE	INTRODUCTION TO ADVANCED RHEOLOGY Presented by Annika Sahlström, MSc Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
3-4 Dec Malmö SE	PARTICLE CHARACTERIZATION Presented by Dr Terence Allen Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
2002	
22 Jan Harwell GB	SLURRY VISCOSITY: MEASUREMENT AND APPLICATION Dr Neil Alderman, Senior Consultant, Rheology / SPS Courses Product Manager, Accentus, 551 Harwell, Didcot, Oxfordshire, OX11 0QJ, UK T: +44 1235 435677 F: +44 1235 434862 E: neil_alderman@uk.aeat.com
23-24 Jan Harwell GB	SLURRY HANDLING Dr Neil Alderman, Senior Consultant, Rheology / SPS Courses Product Manager, Accentus, 551 Harwell, Didcot, Oxfordshire, OX11 0QJ, UK T: +44 1235 435677 F: +44 1235 434862 E: neil_alderman@uk.aeat.com
25 Jan Harwell GB	ON-LINE SLURRY INSTRUMENTATION Dr Neil Alderman, Senior Consultant, Rheology / SPS Courses Product Manager, Accentus, 551 Harwell, Didcot, Oxfordshire, OX11 0QJ, UK T: +44 1235 435677 F: +44 1235 434862 E: neil_alderman@uk.aeat.com
19-20 Mar Malmö SE	GRUNDKURS I REOLOGI (BASIC RHEOLOGY, PART 1 – held in Swedish) Presented by Annika Sahlström, MSc Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
25-27 Mar Wrexham GB	INDUSTRIAL APPLICATIONS OF RHEOLOGY Dr Rob English, North East Wales Institute, Wrexham LL11 2AW, UK T: +44 (0)1978 293417 F: +44 (0)1978 293370 E: englishr@newi.ac.uk

2002	
8-9 Apr Malmö SE	INTRODUCTION TO ADVANCED RHEOLOGY Presented by Annika Sahlström, MSc Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se Info: www.calmia.se
10-11 Apr Malmö SE	GELS, GELLING & THICKENERS Presented by Dr James Goodwin & Dr Paul Reynolds Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se
15-16 Apr Malmö SE	BASIC PRINCIPLES OF COLLOID AND INTERFACE SCIENCE Presented by Prof Tharwat Tadros Calmia AB, Box 2161, SE-220 02 Lund, Sweden T/F: +46 (0)46 211 00 20 E: calmia@calmia.se
21-24 Apr Malaga Spain	8TH EUROPEAN SCHOOL OF RHEOLOGY Rheology for the Process Industries. Directed by Prof. C. Gallegos and Dr N.E. Hudson E: europeschool@uhu.es
3-7 Jun Loch Lomond UK	THEORETICAL, EXPERIMENTAL AND INDUSTRIAL ASPECTS OF RHEOLOGY Dr Nick Hudson, Dept of Pure & Applied Chemistry, University of Strathclyde, 295 Cathedral St, Glasgow G1 1XL, UK T: +44 141 548 2162 F: +44 141 548 4822 E: n.e.hudson@strath.ac.uk
11-15 Nov Glasgow UK	PROCESS RHEOLOGY Dr Nick Hudson, Dept of Pure & Applied Chemistry, University of Strathclyde, 295 Cathedral St, Glasgow G1 1XL, UK T: +44 141 548 2162 F: +44 141 548 4822 E: n.e.hudson@strath.ac.uk
T: Telephone; F: Facsimile; E: Email; Info: WWW URL	