
THE BRITISH SOCIETY OF RHEOLOGY



BSR BULLETIN
incorporating the
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EDITORIAL

In the past year the British Society of Rheology has quietly been undergoing an electronic revolution. The most visible sign of this is the new website, which has now superseded the old site with a more up to date look and greatly increased functionality. However, there have also been developments behind the scenes with a new membership database and other tools to help the BSR officers.

These developments will allow the BSR to improve its contact with members, both through the website and a new monthly email newsletter. The print version of the Bulletin will continue, but in future the Bulletin will also be available from the members' section of the website.

In this Bulletin I have included a number of book reviews, however I have not been able to include any conference reports or articles, as I have not received any. Please think about submitting something. We also urgently need suitable pictures for the front cover of the Bulletin and Rheology Abstracts.

Oliver Harlen

SUBMISSIONS TO THE BULLETIN

We are always looking for articles for inclusion in the Bulletin, preferably on a rheological topic. I am also happy to include conference announcements and any news items of likely to be of interest to BSR members. Electronic copy is much preferred as it saves retyping, most packages supported (Word, TeX, LaTeX, ASCII, RTF) but always provide a contact name, address, eMail, or telephone number in case of problems.

The copy dates for the next Bulletin is 15th November, but late copy can sometimes be accommodated. The facilities of the BSR web sites may also be appropriate. Please contact the Editor for details.

COVER ILLUSTRATION

We are always on the look out for colour or black & white pictures (preferably of a rheological nature!) for the front cover of the Bulletin and Rheology Abstracts. Please contact Oliver Harlen (Bulletin Editor), Gary Tucker (Abstracts Editor) or Nick Hudson (Publications Manager). Suggestions are always welcome!

BSR NEWS

New BSR website

The British Society of Rheology has undertaken a major revision of its website. The new website was built by Jon Harvey under the supervision of Professor Mike Webster and was launched as the official website of the Society in August. As well as having a more up to date appearance the new website has many new features and facilities. In addition to the public pages giving information on the society and conferences etc., the site also contains private pages accessible only to members of the society through a password. These pages allow you to update your membership details and will provide access to electronic versions of the Rheology Bulletin and Rheology Abstracts. The site also now has secure credit card payment facilities to allow membership dues and purchases of Rheology Reviews to be paid online.

The Vernon Harrison Annual Doctoral Prize

The British Society of Rheology has decided to institute a new annual award for the most distinguished PhD thesis in rheology. This will aim to recognise excellence, creativity and novelty in research and will be awarded to the postgraduate member who, in the opinion of the adjudicating committee, has made the most original and significant contribution to any branch of rheological research (experimental, computational or theoretical) leading to the award of a PhD degree in a given academic year. This prize is partly supported by the Vernon Harrison Bequest.

The prize for the award will be £500 and an illuminated certificate.

The deadline for submission of nominations for the first award was 30 September 2003, but late entries may be accepted.

The Annual BSR Doctoral Prize for 2003 is open to any person who has submitted and successfully defended a thesis in any area of rheology at a higher education institution in the United Kingdom between 1 September 2002 and 31st August 2003. Each entry should consist of:

- a two page summary of the research and the key achievements which especially distinguish it as a candidate for this award;
- a letter from the thesis supervisor confirming the recommendation of the award of a PhD by the candidate and supporting the case for the award, highlighting the specific original contributions of the candidate;
- the name and address of the external PhD examiner.

The Committee may subsequently ask to see a copy of the final version of the thesis in reaching their decision.

An Adjudicating Committee appointed by the Council of the British Society of Rheology will consider the entries. Particular attention will be given to the originality and quality of the thesis. Entries will be selected by the Adjudicating Committee for presentation at a meeting of the British Society of Rheology in December during which the AGM of the Society will also be held. The Adjudicating Committee may award any number of first and secondary prizes. Travel funds will be available to assist candidates to attend the prize meeting.

Proposals for the 2002-3 award should be sent to the Secretary as soon as possible:

Professor Tim Phillips

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email: tnp@aber.ac.uk

Commentary on 308th BSR Council Meeting Miskin Manor, 16th April 2003

To coincide with the 308th BSR Council meeting, around seventy rheologists had gathered at Miskin Manor, near Cardiff, to attend the annual International Conference of the University of Wales, Institute of Non-Newtonian Fluid Mechanics (INNFM), 14th to 16th April 2003. The conference focussed on the popular topic of “Rheometry”, second of its type, drawing in industrial and academic participants with a keen interest in the subject. The Manor itself, lay just outside Llantrisant. It has a long and fascinating history, dating back to the 10th Century. More recently, records chart its ownership through Welsh Bardic hands, boasting the honour of entertaining Edward VIII (then, Prince of Wales) and Lloyd George in the 1920’s. There was clear presence and interaction with BSR Council Members at this meeting, a healthy position for the Society and one to be encouraged. This offered the opportunity to hold the second of our three BSR annual Council meetings. The gardens offered just the right atmosphere to stroll around and contemplate academic matters during the conference, which attracted a truly international gathering, drawing upon contributions from USA, Australia, and various parts of Europe. After some most stimulating interchange, conference proceedings were drawn to a close, prior to lunch at mid-day on the third day, and the council meeting was convened.

The weather was outstanding, with temperatures soaring into the 700s, even exceeding those in Greece. Hence, conditions were ideal for Council to pay due consideration to BSR matters. The agenda was dealt with in perfunctory fashion and covered major items of past minutes, reports from standing officers, www-site development/presentation, Rheology Reviews, Vernon Harrison bequest and planning/organisation of future scientific meetings. From the minutes, BSR ties and pins are now available to the membership directly from the Secretary (TNP) at £5 each. Our financial position was held to be sound and proceeding through the new financial year smoothly, though membership subscriptions were still proving somewhat latent (see below). Rheology Reviews had

been launched successfully and circulated at the conference/meeting. This was held to be a significant contribution to the field made by the Society, and one that has received warm commendations by all. The President (GM) thanked all contributors and co-editor Dr David Binding, in particular, for his personal efforts in bringing this “first issue” to press.

The Council was pleased to hear that Dr. Oliver Harlen (Council Member absent with apology) was now a proud father and wished to convey its congratulations. In addition, the Secretary reported the mid-term resignation of Dr. Geoff Brownsey as current Membership Secretary. This was sadly received. Geoff's contributions as a fervent and loyal member of Council have been much appreciated throughout his long service, which spans more than twenty years (in fact, exceeding the accumulated memory of current Council). The correspondent (MFW) agreed to stand in as acting Membership Secretary, offering an interim solution to the vacancy posed.

A central theme of the meeting was that of presentation and discussion by Jon Harvey on the www-site and its development, conveyed through an interactive tour covering issues of membership status, publications, emails, Council files, and role of the site in the future. There was some hot debate and serious consideration paid to resolving our membership payment and electronic communication position with the membership. On-line payment (credit-card, via internet) was discussed and procedure to establish agreed. A number of issues were raised on this point. The next four weeks would see much input from Council, in preparation for our forthcoming mail-shot/email communication with individualised letters to BSR members. This route of direct and personal contact was held to be the optimal manner to resolve such issues as: regularising individual member's fees payment (covering 2001-2003, payment methods of cheque/cc/on-line/other); accumulation of email addresses; purchase of Rheology Reviews (now available at £25); any other miscellaneous matters. There was discussion on publications (Abstracts, Bulletin, Rheology Reviews, advertising), touching upon their storage and delivery via the www-site, as originally conceived. This now appeared to be a reality, which shall unfold during the

proceeding weeks. A gallery section under the site was illustrated (images, videos, animations, etc), linked to an underlying database. Appropriate contributions are sought directly from members to populate this section, these to be up-loaded and categorised accordingly, following the directions provided. This will serve the knock-on effect of proliferating the site with images and break up its otherwise predominately textural look-and-feel. Also, there was brief discussion on provision for an automated "calendar of activity" for Council and monthly-update email messages to members. After the interactive presentation and on behalf of the Council, the President, thanked Jon Harvey for his stirring efforts towards delivery of the substantial state of development of the www-site (along with the wider team involved). This was perceived as a considerable stride forward for the Society and a route through which our organisational activities will



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We look forward to
helping you!

be rationalised in the future. Council were now well on-board and utilising the new site actively.

Future scientific meetings were raised with respect to BSR organisation and/or interaction. Some suggestions were put forward for hosting a major meeting and fitting into the busy rheological conference calendar. Also, domestic shorter meetings were discussed, envisaged of one-day format with a distinctive theme. There was some thought as to combining this with a “Young Rheologist’s” session, involving a keynote lecture (proposals for speakers sought). Another possibility was to link up with the annual INNFM lecture day. With a target date in December 2003, Geoff Maitland and Tim Phillips would give these ideas some serious consideration. Rhodri Williams and Mike Webster offered to look at a meeting in the forthcoming year, December 2004 to be held in Swansea, under topics relating to microrheology. Proposals from the membership would be welcomed here, communicated through the www-site and/or email to Council Officers.

Some recommendations were put forward as to appropriate allocation of the Vernon Harrison bequeath. One idea that found considerable favour was to set up a new BSR Prize for the best current UK Rheological PhD thesis. This prize may be awarded by an adjudication panel at a BSR conference, which would fit well into the pattern of the Young Rheologist’s Conference session.

Ten new members were proposed at the meeting, with one additional application carried over. All were accepted unanimously. This was seen as an encouraging trend. It was agreed that response to new members would be processed as rapidly as possible in the future, adopting a proactive approach to recruitment. Proposals as to possible new Council members were considered, prior to closing the meeting in the early evening on AOB. Date and location of the next meeting is 23rd July at 11am, Imperial College London. The activities of the BSR were held to be in a stable state.

Mike Webster
m.f.webster@swan.ac.uk
18 April 2003

MEMBERSHIP NEWS

We would like to welcome the following new members to the British Society of Rheology:

Dr Moussa Aboubacar,
Mr Papagiannopoulos Aristeidis,
Dr Fawzi Belblidia,
Dr Valery Baev,
Mrs Rangit Barry
Dr Phil Bowen,
Mr Kristopher Coventry
Mr Colin Lee Doyle,
Mr Jonathan Harvey,
Mr Ibrahim Keshtiban,
Dr Joerg Laeuger,
Dr JungYong Lee,
Dr Juanith Lofthouse,
Mr Gwoliang (Jerri) Ngow,
Dr Sujatha Nithiarasu,
Dr Paul O'Connell,
Dr Hamid Tamaddon,
Dr Thomas Waigh,
Dr Andrew Ward-Askey,
Miss Georgina Wilkins,
Dr Alison Williams,
Dr Rhodri L Williams,
Dr Chris Wright.

In addition Dr C F Chan Man Fong has been awarded honorary member status.

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.



Winter Meeting 2003

Current Issues in Experimental and Theoretical Rheology

15th-16th December 2003

The aim of the meeting is to bring together rheologists, especially young researchers, to discuss their current research in General Rheology (experiment, theory, modelling) in an informal atmosphere, with particular emphasis on work in progress and questions which involve or could lead to collaboration between experimentalists, theorists and modellers. The Annual General Meeting of the Society will be held during the conference.

Keynote Lecture: Current challenges in theoretical and experimental polymer rheology. Speaker to be confirmed.

The meeting will also feature presentations by the finalists and the first award of the Vernon Harrison Doctoral Prize for the most distinguished UK PhD thesis in rheology over the period 1 September 2002 to 31st August 2003. It will start with lunch on Monday 15th December and end at teatime on Tuesday 16th December. Accommodation will be in nearby Corpus Christi College; there will be a Conference Dinner on Monday evening.

Professor Tim Phillips

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Registration for the meeting can be made on the form below.

Details of the Vernon Harrison Doctoral Prize are given on page 3 this bulletin.

Registration Form

Title:..... Name:.....
Affiliation:.....
Address:.....
.....PostCode:.....

Registration fee, (includes lunch and dinner on December 15th, overnight accommodation in Corpus Christi College, lunch on 16th December and tea/coffee both days) £110

Students (please include supporting letter from supervisor): £95

I enclose a cheque (payable to British Society of Rheology) for £.....

I wish to pay by credit card (Visa/Mastercard/American Express):

Name on Card :.....

Card Number..... Expiry Date:.....

Signature:.....

I wish to present a paper/poster entitled:

.....
.....

and enclose a 250 word abstract (**Deadline September 30th 2003**)

I wish to apply for the Vernon Harrison Doctoral Prize and my application is enclosed/will follow by **September 30th 2003**.

Registration deadline: **November 28th 2003**, though earlier booking is advised. Please return form and payment to: Professor Tim Phillips, Department of Mathematics, University of Wales, Aberystwyth, SY23 3BZ (email: tnp@aber.ac.uk)



‘RHEOLOGY REVIEWS 2003’

**Published by the British Society
of Rheology.**

Edited by David M Binding and Ken
Walters

Normal Price £25

BSR members £ 20

The field of rheology is extremely broad and continues to grow rapidly. With applications in almost every walk of life, important work is published in a very large number of journals and other media. Although modern computer-based technology enables the *location* of *relevant* studies satisfying certain criteria, it cannot determine the *importance*, or indeed, the *significance* of the studies. For this, it is necessary to tap the knowledge and experience of the world’s most prominent specialists in rheology. This publication aims to achieve this.

This first issue contains reviews of the following areas: the rheology of filled viscoelastic systems (Howard A Barnes); non-equilibrium thermodynamics (Anthony N Beris); the rheology of mobile interfaces (Gerald G Fuller); compressive rheology (Ross G de Kretser, David V Boger and Peter J Scales); finite element methods for integral viscoelastic fluids (Roland Keunings) and the modelling of entangled polymers (Tom C B McLeish). The authors are all internationally renowned specialists in their particular area. They include scientists with both academic and industrial backgrounds. Over 560 references are brought together in 6 coherent, concise treatises of the current state of knowledge in their respective branches of rheology.

To order your copy contact

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

Tel: 44 (0)1970 622775, Fax: 44 (0)1970 622777,

E-mail: dmb@aber.ac.uk

BOOK REVIEWS

“Rheology Reviews 2003”

Edited by D.M.Binding & K.Walters, British Society of Rheology, 2003 (239 pp.). ISBN 0-9538904-8-1

List price £25.00 (BSR members £20). Obtainable direct from Dr. David M Binding, Dept. of Mathematics, University of Wales, Aberystwyth, Ceredigion, Wales, SY23 3BZ, UK or from www.bsr.org.uk

Early this year the British Society of Rheology published this first issue of a new book series, Rheology Reviews. The book (to be produced annually) is a series of review articles. It aims to tap the knowledge and experience of the world's most prominent specialists in rheology, to draw together the content of the growing body of rheological research literature.

The first issue contains reviews of the following areas:

- the rheology of filled viscoelastic systems (Howard A Barnes)
- non-equilibrium thermodynamics (Anthony N Beris)
- the rheology of mobile interfaces (Gerald G Fuller)
- compressive rheology (Ross G de Kretser, David V Boger & Peter J Scales)
- finite element methods for integral viscoelastic fluids (Roland Keunings)
- the modelling of entangled polymers (Tom C B McLeish)

The authors of this first issue are all of international reputation, and the reviews themselves are comprehensive and thoroughly referenced. Each article cites at least 60 papers (some over 100) and provides a clear and accessible overview of the research topic in question. Within each review, the existing literature is described using a coherent framework, and the reader is well equipped to locate key references when further depth is required. Each review will be a vital work of reference for researchers in the area, and this journal should become a standard on the bookshelf of rheological researchers.

Helen Wilson
Department of Applied Mathematics
University of Leeds

“Computational Rheology”

R. G. Owens and T. N. Phillips Imperial College Press, London, 2002 (417 pp.). ISBN 1-86094-186-9

List price £53.00. Obtainable from World Scientific Publishing (UK) Ltd, 57 Shelton Street, Covent Garden, London WC2H 9HE

Rheology emerged as a separate field in 1929 when E. C. Bingham coined the term as the study of the deformation and flow of matter. Given the laws of kinematics and conservation, which are common with solid and fluid mechanics, the constitutive relation occupies the centre stage in rheology, as it serves as the link between deformation and stress to complete the description of fluid flow. The primary aim of computational rheology is to predict accurately the flow of a viscoelastic fluid in complex geometry. This is of great scientific and industrial interest and presents a considerable intellectual challenge. A major difficulty is to construct a physically sound constitutive model for a specified viscoelastic fluid. With such a model, the second difficulty is to solve the resulting set of highly non-linear partial differential equations in a strong flow regime. Although a number of excellent review articles have been written since the comprehensive book by Crochet, Davies and Walters published in 1984, this fully updated monograph written by two frontier researchers is timely and welcome in view of the rapid expansion of the subject area in recent times. The objective of the book is to provide readers with some of the distinctive issues and challenges in computational rheology.

Over the last decade we have witnessed the emergence of three approaches in the development of computational rheology: 1) continuum macroscopic simulation; 2) microscopic simulation and 3) hybrid modelling. Continuum macroscopic simulation usually deals with simulation of large-scale flow, and depends on the reliability of constitutive equations and the accuracy of flow solvers. Microscopic simulation focuses on studying constitutive relationships from a microscopic viewpoint of materials, and usually deals with simple rheometric flows and with relatively small length and short time scales. Hybrid modelling intends to bridge the

gap between these two approaches, the most notable of which is the CONNFESSIT (Calculation of Non-Newtonian Flow: Finite Elements & Stochastic Simulation Techniques) scheme proposed by Öttinger to couple continuum flow simulation directly with stochastic simulation of the microscopic processes in the fluid. This scheme can eliminate those assumptions or simplifications which are often needed to derive a tractable constitutive equation for a complex fluid at continuum level, and it is feasible for complex flow simulations. The book not only provides a self-contained account of continuum macroscopic simulation, but also gives outlines of other two approaches.

The authors cover computational rheology from an elementary level to state-of-the-art developments. In Chapter 1, the characteristics of non-Newtonian fluids are explained and a brief history of computational rheology at continuum level is presented. Chapter 2 contains basic fluid kinematics, conservation laws and a variety of non-Newtonian models including the generalised Newtonian model, non-linear differential models of the PENE type and integral models of the K-BKZ type. Chapter 3 provides valuable insight into the so-called ‘high Weissenberg number problem’ (HWNP) by analysing the structure and properties of the systems of partial differential equations for viscoelastic models of Maxwell-Oldroyd type. Chapter 4 describes the standard procedures for extracting the material functions and parameters from rheometric characterisation of viscoelastic fluids. This is an essential step in carrying out any meaningful computer simulation of viscoelastic fluid flow, whether for validation of numerical results or for prediction of flow behaviour in complex geometry. Chapter 5 presents a range of discretisation methods for the governing equations of viscoelastic flow, from conventional methods such as finite difference, finite element and finite volume methods, to spectral element methods. Treatments of the convective terms in the governing equations and the stabilisation techniques for convection-dominated viscoelastic flows are illustrated and discussed. An account of many important numerical algorithms for solving the algebraic equations arising from the discretisation methods for both differential and integral models is the subject of Chapter 6. A summary of the further

optimisation of the various numerical techniques, developed since the late 1970s to overcome the HWNP is presented in Chapter 7. Chapter 8 and 9, a major part of the book, focus entirely on benchmark flow problems: contraction flows, flow past a cylinder in a channel, flow past a sphere in a tube and flow between eccentrically rotating cylinders. The benchmark flow problems are of both academic and industrial interest. The authors emphasise the necessity of understanding the physical mechanisms of viscoelastic flows, and provide a comprehensive review of relevant experiments and numerical simulations using results from the literature. Taking flow past a sphere in a tube as an example, Chapter 10 illustrates recent development in error estimation and adaptive strategies for viscoelastic flow simulations. Chapter 11 confers additional unity to the book, as it gives a brief outline of more physically based approaches in modelling of viscoelastic fluid flows including the lattice Boltzmann method.

Computational rheology has now evolved into a multidisciplinary topic. The great challenge is to seamlessly bridge the length and time scale gaps when modelling complex fluids which exhibit hierarchies of intrinsic structures, such as polymeric fluids, surfactant solutions, emulsions, suspensions, pastes, liquid crystals, foods and paints. Inevitably, the authors have had to leave out some important topics from the book. For example, we used to take the governing equations of viscoelastic fluid flows from the literature for granted, but it is well known that the construction of equations describing the time-evolution of the viscoelasticity of complex fluids cannot be based on local conservation laws alone and a constitutive model has to be incorporated from a microscopic viewpoint. It is therefore very important to ensure the compatibility of dynamic equations involving different levels of description from microscopic to continuum and to remove any non-physical features of the governing equations. A unified general framework, known as GENERIC (General Equation for the Non-Equilibrium Reversible and Irreversible Coupling) has been developed to provide structural guidance in deriving dynamic equations and constitutive models for complex fluids. Other important areas for which space could not be found are mesoscopic modelling of multiphase complex fluids such

as colloidal dispersions, polymer mixtures and self-assembling systems, and the interesting phenomenon of flow-induced phase transitions. Lattice Boltzmann method is a promising technique in some of those areas. However, it is known that the current lattice Boltzmann method for modelling viscoelastic fluid flow has a serious defect as the solution to the first normal stress difference shows a negative sign as compared to a positive sign for most complex fluids. This indicates that an alternative strategy to incorporate viscoelasticity into the lattice Boltzmann method is needed.

Although the book primarily deals with homogeneous polymeric fluid flows, the principles and techniques presented can be applied in computer simulation of viscoelastic fluid flows in general. With 658 references, the book is an invaluable resource, not only for advanced undergraduate and graduate students but also for experienced researchers who need in-depth knowledge of the mathematical modelling and analysis of viscoelastic fluids. Note also that it would be greatly beneficial to all researchers if there are some essential source codes, such as Numerical Recipes in Computational Rheology, available along with the book.

Xue-Feng Yuan
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“Understanding Rheology”

Faith A Morrison, Oxford University Press, New York, 2001 (558 *pp.*).
ISBN 0-19-514166-0. List price £68.00.

“Understanding Viscoelasticity: Basics of Rheology”

Nhan Phan-Thien, Springer, Berlin, 2002. *ISBN 3-540-43395-3*. Price £22.00.

Two new books have joined the increasing list of textbooks on viscoelasticity. “Understanding Rheology” by Faith Morrison and “Understanding Viscoelasticity” by Nhan Phan-Thien have both

grown out of lecture courses given at Michigan Technological University and National University of Singapore, respectively.

Morrison's book, "Understanding Rheology", provides a gentler introduction to the theory of rheology than existing textbooks such as "Dynamics of Polymer Liquids" by Bird, Armstrong and Hassager. By delaying the complexities of nonlinear strain to chapter 9, the first 8 chapters provide an introduction to rheology at the level of undergraduate fluid mechanics courses. All the calculations are carried out with great care with all the intermediate steps and assumptions carefully set out. Indeed it is, if anything, a little too pedestrian for readers with a strong mathematical background.

The book starts with a short descriptive introduction to non-Newtonian phenomena, including the Weissenberg effect, fluid memory and die swell. Chapter two provides an introduction to vector and tensor mathematics starting from the vector addition rule. Tensors are mostly treated in Cartesian coordinates, although curvilinear coordinates are mentioned, and comprehensive tables of vector and tensor derivatives in spherical and cylindrical polar coordinates are given in an appendix. Chapter three introduces Newtonian fluid mechanics with solution of the usual one-dimensional flow problems.

The discussion of non-Newtonian rheology begins with the discussion of shear and elongational flows in chapters four, five and six. Chapter four acts as an introduction to the definition of material functions in chapter five. Chapter six describes experimental data on a variety of non-Newtonian fluids, including linear and long chain branched polymer melts and block copolymers, together with brief descriptive explanations for their differing rheology.

Chapters seven and eight cover generalised Newtonian and linear viscoelastic models respectively. As in chapter three the flow calculations are set out very clearly with all the intermediate steps. Most importantly she discusses the limitations of each model and the end of the chapter.

Nonlinear viscoelastic models are postponed to chapter 9. This is the least satisfactory chapter in an otherwise excellent textbook. In attempting to cover the many different classes of constitutive equations the clarity of exposition in the earlier chapters is lost. Also Morrison has chosen to adopt Larson's (in "Constitutive equations for Polymer Melts and Solutions") definition of the deformation gradient as the inverse of the usual definition.

The final chapter describes rheometric experiments including modern methods for measuring extensional rheology such as metal-belt extensional rheometer and the filament stretching rheometer. Optical methods based on birefringence are also discussed with a detailed analysis of light propagation in anisotropic media given in appendix E.

This book is very nicely illustrated with many beautifully drawn diagrams, the best I've seen in any textbook in this area. It also contains over 80 pages of appendices, including a comprehensive glossary and listings of material functions for four of the more common nonlinear viscoelastic constitutive equations. A complementary CDrom containing the author's solution to the problems is also available for lecturers using this book.

Phan Thien's book "Understanding Viscoelasticity" is mathematically more demanding. Although the first chapter does provide an introduction to tensor notation this book requires a strong background in mathematics making it more suitable for masters level courses for students with a mathematics or physics background. In contrast to Morrison's book the mathematical arguments are set out concisely with a minimum of intermediate steps and few worked examples. This can clearly be seen by comparing chapter five (14 pages) on inelastic and linear viscoelastic models with chapters seven and eight (80 pages) in Morrison's book.

The discussion of constitutive equations begins in chapter four with a review of classical constitutive equations and the definition of the Weissenberg and Deborah numbers. I particularly like the inclusion of the Pipkin diagram to delineate the different flow regimes,

something that should be in all rheology textbooks. This chapter goes on to describe the continuum approach to the derivation of constitutive equations.

While the continuum approach has provided a framework on what is permissible in a constitutive model it is not able to incorporate the necessary underlying physics of materials with complex microstructure. It is therefore appropriate that the last two chapters are devoted to the derivation of constitutive equations from mesoscopic models of polymer solutions and suspensions. The example of suspensions as complex fluids whose bulk rheological properties can be derived fairly rigorously from the fluid dynamics at the particle level has tended to be overlooked in rheology textbooks.

A nice feature of this book is the inclusion of brief biographical sketches and pictures of some of the historical figures, whose work is mentioned in the text. The criterion for the inclusion of a biography seems to be based on overall fame rather than particular contribution to rheology, so for example Chandrasekhar is included but none of the fathers of rheology, Bingham, Rivlin or Oldroyd are included (though Oldroyd does merit a footnote).

The production quality of this book suffers in comparison to Morrison. Some of the graphs and photographs are rather blurred, presumably as a result of being scanned, and I noticed a few typographical errors. However, Phan Thien's book is less than half the price of Morrison's so it is a case that you get what you pay for. Another criticism of Phan Thien's book is that it does not discuss more recent rheological models, such as those based on reptation theory.

One of the most infuriating difficulties for new comers to viscoelasticity is the plethora of different nomenclatures used in the literature. Ideally a student having read Morrison's book would move onto Phan Thien's book for a more comprehensive discussion of nonlinear viscoelastic constitutive equations. However, I fear such a student might easily become confused as these two books use different sign conventions for stress, different definitions for the

deformation gradient tensor and different symbols for many quantities. While both texts are consistent within themselves the lack of a common standard makes it difficult to move from one book to the other. Morrison does at least acknowledge that other conventions exist and provides a helpful translation table in appendix D. However, with rheology becoming a more commonly taught subject at university it is surely time that we moved towards a common nomenclature in text books, though I suspect this too much to hope for in the near future.

On a more positive note, the addition of these two books now provide a spectrum of different textbooks to suit students with differing levels of mathematical ability.

Oliver Harlen
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University of Leeds.

News from Other European Societies

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



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38th Meeting of the French Group of Rheology , Brest (France), October 15-17, 2003

The topic of this years meeting is "Rheology and physical-chemistry of formulated materials". The aim of the conference is to show the complementarity between the rheological approach and the physical and chemical characterizations in designing formulated materials. The objective is obviously to encourage and to develop exchanges and collaborations between academic scientists and centres of industrial studies (polymers, chemistry, biomedical, food science, paintings, chemical engineering...) about these problems. Indeed, the topics chosen for this meeting are of interest for the rheologist who wants to better understand the links between the physical and chemical interactions and the macroscopic behaviours but also for those who are in charge of formulating a compound in order to obtain a given property.

We want this meeting to foster exchanges between academic and industrials communities around the following types of materials :

- Polymer solutions and gels

- Emulsions and foams
- Paste and suspensions
- Polymer blends, filled polymers and nanocomposites
- Filled elastomers

Systems can be considered from various angles: theory (analytical as well as numerical), experiments (including additional techniques to rheometry ...)

Plenary lectures will be given by:

- Pierre J. Carreau: Comportement rhéologique des suspensions concentrées. Effets des interactions hydrodynamiques et colloïdales
- Didier Roux : Transitions de structure dans des fluides complexes : vers le rhéochaos
- Jean-Eric Poirier : interactions entre structure des émulsions et comportement rhéologique : cas des émulsions de bitume

Over 100 participants are expected with about 40 oral communications and a poster session (best poster award).

This meeting is sponsored by the following companies : Lafarge, L'Oréal, Institut Français du Pétrole, Atofina, Géoservices, Bohlin, Thermo Rhéo, Anton Paar, Bolloré, Eliokem, Michelin, TA instruments Rheometrics Series, COLAS S.A.

More information can be found on the conference website at the following address www.univ-brest.fr/gfr2003 where on-line inscription is also possible. Additional information can be obtained by emailing gfr2003@univ-brest.fr .

Other Events

39th Meeting of the French Group of Rheology will be held in Mulhouse (October 2004) and will be organized by Prof. D. Dupuis.

The Fifth "Meeting of Young Rheologists " organized by Prof. A. Allal will be held in Pau in spring 2004.



President and European Delegate

Prof. Dr. H. Münstedt

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Secretary

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German Society of Rheology (DRG)

Young Rheologists Award 2003

During the meeting of the German Society of Rheology (DRG) on May 5 and 6, 2003, at Berlin, Germany, the biannual Young Rheologists Award (Rheologie-Preis der DRG) was presented to the winners. This year, the independent Jury found two outstanding theses in the field of rheology, which were awarded each with an amount of € 1500,-.

Dr. Heike Bastian, formerly University of Stuttgart, was awarded for her thesis "Non-linear viscoelasticity of linear and long-chain-branched polymer melts in shear and extensional flows".

Unfortunately, due to illness, Dr. Bastian was not able to receive the award during the meeting, so her supervisor, Professor Dr. M.H. Wagner, presented the award to her in Stuttgart some days later.

Dr. Patrick Ilg formerly at ETH Zurich, now at TU Berlin, was awarded for his thesis "Reduced Description of Kinetic Models of Polymer Dynamics" (Supervisor: Prof. Dr. H.C. Öttinger, ETH Zurich).

In the session on Tuesday morning, Dr. Ilg presented his work to the participants of the meeting

Werner Mielke, June 25, 2003

CONFERENCES ANNOUNCEMENTS



The XIVth International Congress on Rheology

August 22 ~ 27, 2004,

COEX Convention Center, Seoul, Korea

Call for Papers

Authors are invited to submit abstracts (each not exceeding 300 words) for either oral presentations or poster presentations. Abstracts should be submitted to the Congress Secretariat no later than September 30, 2003. On-line Abstract Submission via Congress Website (www.icr2004.or.kr) is highly recommended.

Authors will be notified of the acceptance of their papers/posters by January 31, 2004, and then requested to submit the manuscripts no later than March 31, 2004 for the publication of the proceedings in CD Rom. The manuscript will be included in the proceedings only if accompanied by the early registration of the paper/poster presenter.

The topics and the organizers of the Mini-Symposia are below and the presentations will be grouped according to the subject categories by the Scientific Committee.

Mini-Symposia

Computational rheology

Flow instability

Foams, emulsions
& surfactants

Foods & biomaterials

Materials processing

Microstructural modeling

Nanorheology &
microfluidics

Non-Newtonian fluid
mechanics

Polymer melt

Polymer solutions

Organizers

Prof. A N Beris, Prof. N Phan-Thien

Prof. S G Hatzikiriakos, Prof. E G Shaqfeh

Dr. A M Kraynik, Prof. L G Leal

Prof. H A Barnes

Prof. D G Baird, Prof. J A Covas, Prof. J M Piau

Prof. R G Larson

Prof. G G Fuller, Dr. Sangtae Kim

Prof. O Hassager, Prof. G H McKinley

Prof. P Moldenaers, Prof. M H Wagner, Prof. H Watanabe

Prof. S J Muller, Prof. T Sridhar

Rheometry & experimental methods Prof. M R Mackley, Prof. R K Prud'homme

Solids & composites

Prof. G B McKenna, Prof. H H Winter

Suspensions & colloids

Prof. D V Boger, Prof. H Usui

General papers

Prof. J C Hyun

Important Dates

Deadline for Abstract Submission

September 30, 2003

Notification of Acceptance

January 31, 2004

Deadline for Manuscript Submission

March 31, 2004

Deadline for Early Registration

April 30, 2004

Social Program

The Organizing Committee is to prepare interesting and enjoyable social programs for all the participants of the ICR2004 to give special memories and cultural experiences during their stay in Korea. A half-day excursion to Kyungbok Royal Palace including the adjacent National Museum is an example. Various pre- and post-conference tour programs are also recommended to the participants for their further enjoyment in Korea.

Congress Secretariat

The Korean Society of Rheology

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INDUSTRY NEWS

PAAR PHYSICA: RHEOMETER FOR POLYMER MELTS

Paar Scientific announced the introduction of the new Physica Polymer Discovery System (PDS), a complete rheological test system configured specifically for testing plastics and polymers.

Built around an MCR 500 research grade rheometer configured with a forced gas oven, the PDS features a complete suite of rotational and oscillatory tests including creep and automated master curve generation, advanced analysis software, and a special melts sample prep kit to simplify sample preparation, loading, and cleaning. The system utilizes Physica's proprietary Direct Strain Oscillation (DSO) for true controlled strain operation.

Designed to fulfill the specific needs of the plastics and polymer industries, the Polymer Discovery System is equally at home doing repetitive melts testing as well as product development and research. The wide torque range allows measurement of low viscosity molten polymers, while the open architecture facilitates sample loading and cleaning. Optional accessories extend the range of the instrument to include thermosets, solids, and elastomers, while DMA experiments can be run using the optional torsion fixture.

The system comes complete with an advanced software package including modules for calculating Relaxation Spectrum, Retardation Spectrum, Time-Temperature Superposition, and Molecular Weight Distribution. Data analysis and report generation can be automated for speed and error-free operation.

NEW SOLIDS TESTING CAPABILITY FOR BOHLIN RHEOMETERS

Bohlin Instruments has introduced rectangular torsion fixtures for its Gemini and C-VOR rheometers which are designed to accept a solid sample with a free length of 50mm, width to 13mm and thickness to 10mm. The ability to measure on larger sample sizes is of particular use for samples containing small particles of aggregate such as bituminous mixes where bulk property determination of the mix is of practical interest.

The new fixtures are designed for use in conjunction with Bohlin,s forced gas oven (ETC) and enable the characterization of dynamic properties, such as loss and storage moduli, over a wide temperature and frequency range. The temperature range can be extended downwards to 150°C when the liquid nitrogen cooling option is employed.

Spring loaded and infinitely adjustable clamps are designed to make sample loading easy without the need to select spacers or shims according to the sample thickness. Uniformity and reproducibility of clamping pressure is ensured by the use of a pre-set torque driver to tighten the sample clamps. A particular feature of the Bohlin design is the ability to fully load and accurately align the sample within the clamps remotely from the rheometer unit. This is accomplished using a special sample alignment jig and significantly simplifies the experimental set up procedure.

For futher information on the above and all Bohlin products contact ***sales@bohlin.co.uk*** or visit ***www.bohlin.com***

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/>

2003	
Oct 12-16 Pittsburgh USA	75th Annual Meeting of The Society of Rheology Info: www.rheology.org/sor/annual_meeting/2003Oct/
3-8 Nov Sendai Japan	3rd International Symposium on Slow Dynamics in Complex Systems Info: www.ifs.tohoku.ac.jp/slow-dynamics/
3-5 Nov Santa Fe USA	Multiphase Flow 2003 Info: www.wessex.ac.uk/conferences/2003/multiphase2003/index.html E: enquiries@wessex.ac.uk T: 0238 029 3223 F: 0238 029 2853
4-6 Nov Santa Fe USA	Moving Boundaries 2003 Info: www.wessex.ac.uk/conferences/2003/movingboundaries2003/index.html E: enquiries@wessex.ac.uk T: 0238 029 3223 F: 0238 029 2853
5-7 Nov Santa Fe USA	Materials 2003 Info: www.wessex.ac.uk/conferences/2003/materials2003/index.html E: enquiries@wessex.ac.uk T: 0238 029 3223 F: 0238 029 2853
16-21 Nov Washington DC USA	ASME Advances in Materials Process Science Prof Dennis A. Siginer ,Wichita State University 1845 Fairmount ,Wichita, KS 67260 T: +1 316 978-3400 F: +1 316 978-3853 E: dennis.siginer@wichita.edu Info: www.asmeconferences.org/congress03
16-21 Nov Washington DC USA	ASME Rheology and Fluid Mechanics of Nonlinear Materials Prof Dennis A. Siginer ,Wichita State University 1845 Fairmount ,Wichita, KS 67260 T: +1 316 978-3400 F: +1 316 978-3853 E: dennis.siginer@wichita.edu Info: www.asmeconferences.org/congress03

T: Telephone; F: Facsimile; E: Email; Info: WWW URL

2003	
15-16 Dec Cambridge	Current Issues in Experimental and Theoretical Rheology Prof T Phillips, Dept of Mathematics, University of Wales, Aberystwyth. T: 01970 622769 F: 01970 622777 E: tnp@aber.ac.uk .
20-22 Dec Timimoun Algeria	Rheology of Complex Fluids: Industrial Impact Dr M Chaouche, ENS Cachan E: chaouche@lmt.ens-cachan.fr Info: www.lmt.ens-cachan.fr/timimoun
2004	
5-7 April Chester	INDUSTRIAL RHEOLOGY Dr Gareth Roberts, School of Informatics, University of Wales, Bangor, Gwynedd, LL57 1UT. T: 01248 351151 ex 2480 F: 01248 383663 E: g.w.roberts@bangor.ac.uk
17-19 May Santiago Chile	16th INTERNATIONAL CONFERENCE ON HYDRO-TRANSPORT Miss K Coupar-Evans, BHR Group Ltd, Fluid Engineering Centre, Cranfield, Bedford, MK43 0AJ T: 01234 750422 F: 01234 750074 E: kevans@bhrgroup.com
22-27 Aug Seoul Korea	XIV INTERNATIONAL CONGRESS ON RHEOLOGY Congress Secretariat, The Korean Society of Rheology, Rm.806, New Bldg., The Korea Science and Technology Center 635-4 Yeoksam-dong, Kangnam-ku, Seoul 135-703, Korea Info: www.icr2004.or.kr . E: icr2004@icr2004.or.kr
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COURSES

2003	
3-7 Nov Glasgow UK	PROCESS RHEOLOGY Dr Nick Hudson, Dept P&A Chemistry, University of Strathclyde, 295 Cathedral St, Glasgow, UK. T: +44 (0) 141 5482162; F: :+44 (0) 141 5484822. E: n.e.hudson@strath.ac.uk
10-11 Nov, Warwickshire UK	RHEOLOGY WORKSHOP Steve Goodyer, Paar Scientific Ltd, 13, Harforde Court, John Tate Road, Hertford, SG13 7Q T: +44 (0)1992 514730; F: +44 (0)1992 514739 E: goodyer.s@anton-paar.com
12-13 Nov, CCFRA Gloucestershire UK	RHEOLOGY & TEXTURE TESTING Steve Goodyer, Paar Scientific Ltd, 13, Harforde Court, John Tate Road, Hertford, SG13 7Q T: +44 (0)1992 514730; F: +44 (0)1992 514739 E: goodyer.s@anton-paar.com
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2004	
8-11 Jun Glasgow UK	THEORETICAL, EXPERIMENTAL AND INDUSTRIAL ASPECTS OF RHEOLOGY Dr Nick Hudson, Dept P&A Chemistry, University of Strathclyde, 295 Cathedral St, Glasgow, UK. T: +44 (0) 141 5482162; F: :+44 (0) 141 5484822 E: n.e.hudson@strath.ac.uk
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