
THE BRITISH SOCIETY OF RHEOLOGY

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Happy 20th Anniversary
to **UWINNFM**



Rheology

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THE BRITISH SOCIETY OF RHEOLOGY

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THE BRITISH SOCIETY OF RHEOLOGY



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EDITORIAL

SUBMISSIONS TO THE BULLETIN

Submissions to the Bulletin may be made by any practical means – post, email, disk, fax, pigeon, donkey, guide dog, *et cetera* but electronically is preferred (saves typing...). Most packages supported (Word, TeX, LaTeX, WordPerfect, ASCII, RTF) but always provide a contact name, address, e-mail, or telephone number in case of problems. The deadline for submission is Feb. 15th, June 15th and Oct. 15th, respectively, for three issues annually. 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 (xue-feng.yuan@manchester.ac.uk) for details.

COVER ILLUSTRATION

A group photo was taken at an international conference to celebrate the 20th birthday of the UMINNFM – University of Wales Institute of Non-Newtonian Fluid Mechanics at Portmeirion Hotel, Gwynedd, UK. The details of the event can be found in the conference report in this issue. Image courtesy of Professor Chris Petrie, School of Mechanical & Systems Engineering, University of Newcastle upon Tyne (chris.petrie@newcastle.ac.uk).

We are always looking for appropriate images for the front cover of the Bulletin and Rheology Abstracts (preferably of a rheological nature!). Please contact either Xue-Feng Yuan (xue-feng.yuan@manchester.ac.uk) or Nick Hudson (n.e.hudson@strath.ac.uk). Contributions are always welcome!

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, including

- advance your knowledge by attending our conferences
- receive publications including Rheology Abstracts, Bulletin and Rheology Reviews
- learn of current instrumentation and accessories plus new developments.
- access to non-Newtonian Club linking industry and academia
- travel Grants, Poster Prizes, Career Opportunities
- network with 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. For the details, you are warmly welcome to visit our web site <http://www.bsr.org.uk/>, and to apply for membership on-line.

New BSR President's Message



It was a tremendous honour to be asked to be the president of the British Society of Rheology. I was introduced to rheology during my undergraduate training when I undertook an industrial placement at ICI Paints Division under the supervision of Trevor Strivens. Through this I was offered the possibility of studying for a Doctorate at the Katholieke Universiteit Leuven in Belgium, under the Supervision of Professor Jan Mewis who was and remains an inspirational figure to me. My thesis was entitled "The Rheology of Well Characterised, Non-Aqueous, PMMA Suspensions" the aim of the work being to investigate the relationship between rheology and

particle size in non-aqueous suspensions of sterically stabilised particles. One of the major findings from these studies was that the steric barrier surrounding the particles leads to a measureable viscoelastic response that could be used to characterise the interparticle potential in such materials.

After completing my Doctorate in 1986 I joined the Corporate Colloid Science Group at ICI Runcorn where I worked in Richard Buscall's team. Working with Richard was always a very stimulating experience, and we still keep in touch to this day. My work had two major themes, one was based on a continuation of my PhD work, and done in collaboration with Leuven through IFPRI (the International Fine Particles Research Institute), and the other was the development of simulation based studies of the properties of disordered particle mixtures related to coatings and pyrotechnic applications.

The rheological studies were aimed at investigating the flow behaviour of highly concentrated suspensions that displayed shear thickening behaviour. In collaboration with the Leuven group we were able to show that the steric coating of the particles was key to the high shear-rate shear thickening behaviour of the suspensions and that this could be readily manipulated by changing the solvent quality of the suspending medium for the steric barrier.

In 1993 the break-up of ICI (into ICI and Zeneca) led to me leaving the company and joining Unilever R&D at Colworth House in Bedfordshire. The Colworth Laboratory is a major hub for foods R&D in Unilever, although we also do a considerable amount of home and personal care related research. The nature of this research includes biological, mathematical, physical, chemical, process, safety & consumer sciences as well as all the product development related work which dominates the site. This mix of topics, combined with the highly collaborative

nature of work in Unilever makes it a lively and interesting place to work, and has given me the opportunity to work and interact with many talented colleagues and friends, as well as a number of notable researchers including Peter Lillford, Ian Norton and Alex Lips.

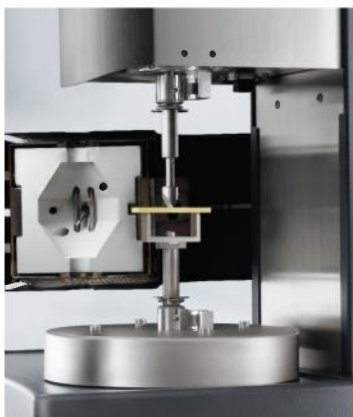
Unilever products offer a rich field for the study of the behaviour of soft matter. This inevitably includes rheology as an important tool, because of its relevance to the manufacture, stability and consumer perception of the product. Because of this, during my time at Unilever I have had the opportunity to work on a wide range of materials including emulsions, foams, suspensions and biopolymer based gels and gel mixtures, all of which are key to the Food and Personal Care products that Unilever manufactures. Some highlights of this work have included studies of the phase behaviour and rheology of biopolymer mixtures and surfactant biopolymer mixtures; particle stabilised emulsions and their novel stability and flow behaviour; and most recently the self-assembly and gelation behaviour of peptides and their derivatives.

Within this context, I have always seen the Society as a means of bringing together a community of very friendly people, and to provide support in many ways, including financial support for students and the organisation of meetings, not to mention our publications. I believe these aspects should continue to be the most important themes for the future of the Society as well. I suppose I consider myself as someone who prefers to use a “light touch” approach to things in general (the phrase “if it ain’t broke don’t fix it” is close to my heart). However, the manner in which scientific publications and societies operate is changing rapidly in this age of the web and it is important that we think carefully about how these changes may affect our Society, and if there are any opportunities for us as well. The Council of the BSR is always reviewing the Society’s strategy in this context, and I feel that taking this approach will allow the society to remain as strong and vibrant as it is and to seize opportunities for development as they arise in the future.

Bill Frith
BSR President

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BSR NEWS

BSR Annual Award 2010 Professor Joao Maia

The British Society of Rheology Annual Award for 2010 is awarded to Professor Joao Maia from Case Western Reserve University in Cleveland Ohio, where he is an associate professor in the Department of Macromolecular Science and Engineering.

Joao's career in rheology began in Aberystwyth where he studied for a PhD under the supervision of Ken Walters. His doctoral thesis was entitled "The Rheology of Polymer Solutions: from the dilute solution to the melt", in which he sought to find models capable of describing the rheological behaviour of polymer solutions over a wide range of concentrations.

After completing his PhD he returned to his native Portugal where he joined the Department of Polymer Engineering at the University of Minho. Here the focus of his research moved towards more industrial applications of rheology particularly to polymer processing, food and biopolymers and the use of rheology to characterise new complex multiphase materials such as polymer blends and composites.

A continuing theme in his research has been the challenge of measuring extensional rheology and the rupture behaviour of fluids in extrusion. This has led him to develop a series of novel extensional rheometers for polymer melts including a controlled stress extensional rheometer.

In 2009 he moved to his present position at Case Western Reserve University where he has continued these lines of research as well as pursuing new projects on layered co-extrusion and nanostructured materials.

He has over 70 published papers and four patents covering the design of rheological measurement instruments.

In addition Joao has been instrumental in the developing a Europe-wide postgraduate programme in Rheology through the coordination of an EU funded Erasmus Mundus Masters programme in Rheology. He has also been very active in the organisation of rheological meetings including the first ever AERC meeting, held in Portugal in 2003 and of course next year's International Congress of Rheology in Lisbon.

Oliver Harlen
Past BSR President

BSR Student Travel Awards

The 301st Council Meeting established the principle that student travel grants have the objective of encouraging students to disseminate their research. Applicants for a student travel bursary must normally have been a member of the Society for 9 months, may be working worldwide and presenting research at a conference, by paper or poster. The grant will be made on receipt of a report on the event.

The British Society of Rheology wishes to establish a transparent mechanism for the award of travel bursaries and to solicit applications from its student membership. Travel bursaries are available to student members of the Society to present their research at a conference that contains a strong rheological element, in situations where no other sources of funding are available to cover the whole cost of the meeting. Suitable conferences include the International Congress of Rheology, the Annual European Rheology Conference and conferences organized by the Society.

The next closing date for consideration of the award of a travel bursary is 31st October 2011 with successful applicants notified by 30th November. Applicants should include in their submission the name and location of the conference, the title, authors and abstract of the paper submitted to the conference, a breakdown of the projected costs of attending the meeting and a supporting letter from their research supervisor. The support of the British Society of Rheology should be mentioned in the conference presentation. The Society's logo may be used for this purpose. Payment of the bursary will be made on receipt of a report on the conference. The conference report will be published in the Bulletin of the Society. Applications for a travel bursary should be sent to the Secretary (secretary@bsr.org.uk).

Simon Cox
BSR Honorary Secretary

BSR Vernon Harrison Award 2011

In 2003 the British Society of Rheology decided to institute a new annual award for the most distinguished PhD thesis in rheology. The aim of this award is to recognize excellence, creativity and novelty in research and will be awarded to the postgraduate student 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. Dr Steven Lind of Cardiff University was the 2010 winner with his thesis on "A Numerical Study of the Effect of Viscoelasticity on Cavitation and Bubble Dynamics".

The prize for the award will be £500 and an illuminated certificate. The deadline for submission of nominations for the ninth award is 30 September 2011.

Entries for the Annual BSR Doctoral Prize for 2011 should now be submitted. 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 2010 and 31st August 2011 is eligible, whether a member of the Society or not. 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. 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 2010-11 award should reach the BSR secretary on secretary@bsr.org.uk by September 30th 2011.

Simon Cox
BSR Honorary Secretary

Rheology Abstracts - Some questions answered

"It is a shame we don't get access to Rheology Abstracts any more," a colleague and BSR member told me recently. The good news, as I told him, is that as a BSR member he does, as a series of searchable pdfs through the BSR website (<http://www.bsr.org.uk/>).

"So what is Rheo Abstracts?" Rheo Abstracts contains abstracts of most of the published papers and other literature likely to be of interest to practising rheologists in a variety of different fields. In a typical year a thousand or more abstracts culled from around a hundred journals are published. As you can imagine, this only survives with the work of our volunteer abstractors. We do our best, and it is only as complete as we have the volunteers to make it. Whether it is carbon, carbohydrates, ceramics, cereals or concrete (and that is just a sample of the letter c), we aim to identify papers of interest to rheologists in a diverse range of fields. But we can only do as good a job as people will help with.

"But I have access to Web of Science. How can Rheology Abstracts help me?" Yes, there are some very useful search engines available online. But there are also a lot of different terms used in rheology. While Rheology Abstracts will never be a replacement for a complete search, we think it is a useful tool for searching a particular topic where you can already take for granted that the rheology part of the search is satisfied. We like to think that our abstractors do a better job of identifying articles of interest to rheologists than Google, Elsevier or ISI's algorithms.

"Ok, I'd like to be abstractor. How can I help?" First of all, thank you! Over the next few months, we will be trying to put into place a few different things that will help you to help us. In the meantime, the easiest way to start is to contact me (contact details on the inside front cover) and either suggest a journal you would like to look at or ask for one that needs abstracting. Then go through the journal and identify the abstracts of interest.

"So how long will it take?" The answer is flexible depending on how many journals and issues you are prepared to do. The time taken to wade through a year's worth of Science will be longer than the time taken to go through a single issue of Physical Review E, but both are valuable and appreciated.

Rheology Abstracts is not, by any stretch of the imagination, an enjoyable read, but we hope that you will find it useful, and we hope that it serves a niche role for the rheology community.

Alex Lubansky
BSR Honorary Abstracts Editor

20th Anniversary Conference of the University of Wales Institute of Non-Newtonian Fluid Mechanics

The British Society of Rheology has had a long association with Wales and Welsh rheologists and it is a real pleasure to report on this celebration of 20 years of the INNFM which unites the talents of rheologists in Aberystwyth, Cardiff and Swansea. The conference was held in Portmeirion, an Italianate village on the coast of North Wales (of which more below) and the INNFM booked all the accommodation in the village and more to host a gathering of 64 delegates and around 20 of their wives (or partners).

This is not a massive gathering, but that really is the point. Over its 20 years the INNFM has organised many gatherings of this size which participants appreciate for the relaxed and friendly atmosphere that we find. The scientific programme has no parallel sessions and the organisers can be relied on to invite a series of top rheologists, old and young, who are, mostly, high quality speakers. Many of the speakers this year expressed their appreciation of the welcoming Institute; Gerry Fuller acknowledged its welcome to young rheologists and their wives while Gareth McKinley noted the significance of 1991 as the year of the founding of the INNFM, Gareth's PhD and his wedding. The sense of a rheological community was further demonstrated by expressions of concern at the absence and health of regular participants such as David James and Ralph Oliver.

The BSR appreciates the close relationship between the Society and the INNFM and is grateful for the hospitality extended to it which allowed time in the programme for three BSR events, the AGM, the presentation of last year's Annual Award and the delivery of a Presidential Address by the retiring President. The meeting attracted a number of past Presidents of the BSR and senior office-holders



in other rheological societies including the Society of Rheology, the European Society of Rheology and the International Committee on Rheology; at least twelve countries outside the UK were represented. Pictured above, outside the dining room, are the "Pacific Rim" contingent (from Western USA, Korea and Australia).

The programme ran from lunch on Monday 18th April to noon on Wednesday 20th April. It consisted of 29 papers presented in 7 lecture sessions, a poster session with 20 posters, two buffet lunches and two excellent dinners. Maybe the Institute should be renamed the

Institute for Gourmet Rheology. Two dinners meant two after-dinner speeches - this is not for the faint-hearted and the dedicated rheologist may wish to skip to the section headed **Rheology**, below.

On the Monday, Peter Townsend gave us a history of the Institute which emphasised the relaxed nature of our hosts, pictured on beaches and holding aquatic meetings. It is worth setting alongside this lightheartedness the academic significance of the Institute, attested by the presence of Professor Marc Clement, Vice-Chancellor of the University of Wales, at the dinner. His presence did not appear to inhibit Peter and he went on to discuss the dangers inherent in a bilingual environment where an “out-of-office” e-mail can be mistaken for the requested translation. He alluded to the film-making side of the INNFM and the refusal of Ken Walters to allow a **RHEOLLYWOOD** sign on the hillside above his home.

After the Tuesday Conference Dinner, Jeff Giacomini went in to bat for the guests (Jeff - I'll explain “cricket” and “metaphor” to you if you have a lot of spare time). He too had encountered some bilingual faux pas on his cycling around the area as well as a mystifying sign warning of a slow-moving vehicle one mile ahead (of the non-moving sign). He also recorded his gratitude in a peculiar way to those who had helped him out after his computer crashed on the flight over from Wisconsin. The Americans call this way of treating one's friends “roasting”, so I guess I don't need to explain “metaphor” to Jeff.

Rheology

The scientific sessions were held in the Hercules Hall under a mighty ceiling with representations of the 12 labours of Hercules. This was a fine setting, but one or two speakers failed to master the acoustics or construct their slides in a way that made them legible from the back of the hall. There is room for a digression here on the topic of what speakers seriously expect their audience to learn from their



presentations, but I shall not pursue this here - the majority of speakers gave me enough clarity to judge the conference to be a considerable scientific success, overall.

The opening day gave us nine papers from eight countries: Spain (Cris Gallegos), Slovenia (Igor Emri), Switzerland (Adam Burbidge), USA (Gareth McKinley, Gerry Fuller), Canada (John Dealy), Australia

(Paul Slatter), Sweden (Mats Stading) and Germany (Manfred Wagner) - enough to counter any idea that this might be a small provincial event. Seven of these nine

papers could be classified as biorheology or rheometry (or both) and two other themes that could be identified at the conference were industrial rheology and computational rheology.

The centrepiece of the conference was a session reuniting two of the three speakers at the original (1991) INNFM conference, Marcel Crochet and Anthony Pearson. In place of the third, for this year's historic session we had David Boger and Roger Tanner. Each of these has been awarded the Gold Medal of the British Society of Rheology. Pictured are Roger, Marcel and Anthony. (David is pictured above, second from the left in the "Pacific Rim" picture.

Marcel (now Baron Crochet) is a rheologist whose career took him to the heights of Rector of his university and he drew on his experience of rheology and academic politics to give us a talk on "Innovation" which held some warnings for academics in their ivory towers and for politicians



about fostering innovation on a global scale without the constraints of sectional interests. The latter point is illustrated by the OECD which has a web site devoted to innovation strategy, but India, China, Brazil and Russia are not members. The warning to academics lies in the minimal cooperation with universities in the fostering of innovation in EU countries, notwithstanding the existence of the



Framework Programmes (the current one is the 7th). Marcel alluded to the early days of BRITE-EURAM and collaboration between Aberystwyth and Louvain-la-Neuve and there is no doubt that collaborative academic research has been significant.

Anthony referred to the lasting contribution of Jim Oldroyd (around 60 years ago), his first visit to Aberystwyth (40 years ago) and his review of rheology in science and engineering at the first INNFM meeting (20 years ago). His 2011 update highlighted the increased computational power available to us, the increasing role of physicists in rheology and the dominance of new materials. He identified materials science as the driving

force for innovation. My notes have the phrase “acronym bombardment” but I not sure if this was Anthony’s phrase or what I felt he was doing to me. He also alluded to the separation between rheology and earth sciences and identified a grand challenge in the prediction of lava flows and explosive volcanic eruptions, not to mention earthquakes.

David’s talk was based on his dealings with the mining industries and again we were taken on a journey from the scientific to the political. The problems that arise from mine waste are of a scale and importance second only to global warming and climate change. The record of tailings dam failures (such as that in Hungary in October 2010) is appalling. Rheology is important in discussion of dewatering and dealing with the thickened waste; yield stress is the important parameter, not concentration. There are regular meetings - “paste and thickened tailings seminars” - all over the world but they do not reach the people who can bring about change. David quoted Einstein on people “doing the same thing over again and expecting a different outcome” - that is Einstein’s definition of insanity. The problems are financial - accounting practices don’t favour taking a long-term view and regulators have neither the money nor the knowledge to be effective. There are rheological problems too - the talk ended with a challenge to study the interaction between shear and compression in suspensions.

Roger balanced the session with a more concentrated dose of rheology; his historical reference was to the work of Rob Roscoe some 50 years ago, which Roger suggested has been undervalued; it provides a basis for the well-known Krieger-Dougherty formula. The motivation for discussing concentrated suspensions in a non-Newtonian matrix was the idea that this might be a way to model a semicrystalline material (such as polypropylene) or a material like bread dough with starch particles and a protein network. There is a shortage of experimental data at present but the hope is to use a simple approach in order to develop a model that can be used.

There are a few conflicts between the messages from these four speakers, but these are issues to generate a creative tension rather than disagreements. I have in mind Roger Tanner’s idea of a simple approach and Anthony Pearson’s comments on the complexity of real industrial fluids. There is



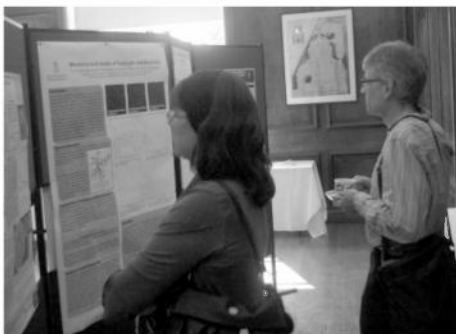
also Marcel Crochet’s discussion of working within the structures that exist set

against David Boger's searing criticism of the mining industry and its finance. I should end this section by recalling that David did highlight two or three signs of hope in industrial and investment practice.

There is not space to do justice to any of the other presentations and I hope I may be allowed to select a few for comment on the basis of potential discussion or actual lively discussion at the conference, and express personal views which you may choose to attribute to my emeritus status and fading memory. I would emphasize that there were a number of excellent papers that I am not even mentioning, including some on my own particular areas of interest.

A pair of papers on computational rheology seemed almost too good to be true in the computational savings they offered. Roland Keunings gave us "Computational Rheology and the Proper Generalized Decomposition" followed by Paco Chinesta on "The Proper Generalized Decomposition for the Control of Polymer Processing Applications". For the non-mathematician there was the entertainment value of demonstrating a smartphone application created to extract results for relevant parameters from a parametric solution obtained once for all. The idea behind PGD is similar to "Proper Orthogonal Decomposition" or "Principal Component Analysis" and it reduces the dimensionality of the (computational) problem by finding a small number of combinations of variables that give a good approximation to the system behaviour. At the end of the two papers, the question of how one apparently gets something for nothing was in my mind, but I do feel there is something well worth investigating in this work.

Igor Emri's presentation had more of a philosophical flavour; the paper was entitled "Mechanics of Dissipative Systems: Some Open Questions". He started from Prigogine's idea that energy is required to maintain structure and wanted to regard energy as the primary quantity. He asserted that if one does not move the boundary (of a mechanical system) there is no force or stress. As with much philosophy, this left me with the question of whether something profound had been offered or whether there was anything there that was not obvious or even misconceived. Clearly in such a case, the fault may well be with the listener, but the discussion



told me that I was not alone in having doubts.

The poster session was well supported and the winner of the BSR-TA poster award was Dan Curtis from Swansea University for his poster “Use of the spectral dimension in microstructural characterisation of fractal hydrogels and blood clots”. The prize was announced by Gerry Fuller, on behalf of the panel of three judges, and awarded at the conference dinner by Peter Hodder, Senior Application Scientist of TA Instruments. By sheer coincidence there is a photographic record of Paula Moldenaers and Gareth Roberts studying the winning poster.

Another award made at the meeting was the 2010 Annual Award of the British Society of Rheology, made to João Maia who gave the Annual Award lecture on “Another new rheometer” - a second version of his Controlled Stress Extensional Rheometer (CSER) which aims at ever higher strains so that the rupture of filaments can be studied. This lecture was followed by the Presidential Address by Oliver Harlen, the retiring President of the BSR, on “Numerical simulation of viscoelastic jet breakup in inkjet printing”, nicely combining the computational and industrial themes.



Chris Petrie
University of Newcastle upon Tyne

A view from a non-rheologist

The INNFM conferences have regularly attracted wives and partners of the participating rheologists and Portmeirion was clearly an attractive venue. The village of Portmeirion deserves a few words. It was created over a period of 50 years on a small peninsula in North Wales not far north of Harlech. The buildings are in a variety of styles, brightly painted and surrounded by statues and much ornamentation.



The Hercules Hall, where the conference was held, consists of rescued parts of a Jacobean Hall set in an Arts and Crafts building - the Town Hall. To many people the village is familiar as the setting for the 1960s television series, "The Prisoner". A quotation from the creator of the place, Sir Clough Williams-Ellis, is apt: "Portmeirion is in fact very definitely



scaled down, and if not strictly 'miniature' is none the less rather cosily compact and intimate." This description might easily be applied to the INNFM conferences.

Mary Walters arranged a trip to Harlech Castle for those not participating in the conference. We could climb to the top of the castle, walk around it, visit an exhibition and explore the village. Although the weather made outdoors very attractive, a teashop tempted some. No other formal excursion was necessary, with the village and its gardens to explore, old friends to meet and exchange news with, and new friends to make among the 20 or so "accompanying persons".



The weather was superb and we enjoyed the views across the estuary and out into Cardigan Bay. Indeed the sunshine and blue sea enhanced the Italian atmosphere that the architecture gives.

Our thanks are due to Mary and the other INNFM wives (Dwyrdd Townsend, Celia Davies, Suzy Webster and, the newest member of the home team, Ruth Cox) for the way they have helped to establish a community of friends among the rheological hangers-on, old and new.

Diolch yn fawr!

Ann Petrie

Photograph credits – the group at Harlech Castle by Mary Walters; the bay from Portmeirion by Marcel Crochet; the group photo by Gareth McKinley's father; others by Chris Petrie. It is intended to make these photographs available in colour on the British Society of Rheology website (<http://www.bsr.org.uk/>).

Report on PPS27

Marrakech, Morocco, 10-13 May 2011

The Polymer Processing Society held its 27th Annual Conference in the fascinating and exotic location of Marrakech, Morocco. About five hundred delegates attended which was some two hundred and fifty less than originally expected because a large number of delegates elected not to go because of a terrorist explosion in Marrakech a week before the meeting. Those that did attend had no regrets and were thanked by the organisers for not being deterred by the actions of a few. The genuine warmth and friendliness of the Moroccan people was evident throughout the conference and the whole meeting was held in an excellent atmosphere of *entente cordiale*. The presentations were generally of a high standard with lots of scientific and rheology content.

The UK was not particularly well represented as one of the fifty seven countries attending. Prof Phil Coates and his team from Bradford University flew the UK academic flag with your correspondent, Malcolm Mackley probably the only other academic present. Representation from UK industry seemed also to be very sparse.

There was plenty of rheology at the meeting and in particular there was a special symposium in honour of Pierre Carreau. Of course his famous equation was cited many times, although Pierre himself gave an interesting plenary on the role of nanoclay composites as gas barriers within thermoplastics. Another notable plenary was given by Joao Maia on Extensional Flow behaviour of polymer melts. Joao was this year's recipient of the PPS Morand-Lamda annual award and at a splendid banquet he acknowledged the mentoring of his career by both Ken Walters and Jose Covas.

It is difficult to identify a clear theme at a meeting of this type which at times had ten parallel sessions, however a definite highlight was the inaugural lecture by Han Meijer (Eindhoven Technical University). Real progress has been made over the last decade in understanding the solid state mechanical deformation behaviour of polymers in terms of the polymer chain glass transition temperature and polymer chain entanglement density. There is now almost a clear understanding of polymer rheology from the melt to the viscoelastic solid.

Nanostructures continue to fascinate and tease with the promise of improved properties whether they are mechanical, electrical or gas barrier potential enhancement. Clays, carbon nanotubes and now graphene are all fighting it out with other more exotic candidates. So far the enhancements disclosed in my view have been incremental rather than sensational, however the theoretical potential still excites more research.

Polymer processing remains a very important area of research and development. It is a pity that in the UK it is currently not seen as fashionable, exciting and worthy

of support both by industry, academia and funding bodies. The demand for plastic components can only steadily increase and in fact plastic manufacturers are currently doing very well. Life without plastic would now be very strange.

Malcolm Mackley
University of Cambridge

Report on 7th Annual European Rheology Conference 2011

Suzdal, Russia, 10-14 May 2011

The 7th annual meeting of the European Society of Rheology was held in Suzdal (Russia). There were more than 300 participants to give over 155 oral presentations and about 100 posters. The meeting was held in the Suzdal Tourist Center, the famous and historic place, surrounded by many ancient and beautiful buildings.



The conference was held over 3 ½ days, with 5 parallel sessions covering 10 themes of research areas in rheology. I attended more than 20 talks across a large range of subjects. To keep this report short, I will only discuss the 3 plenary lectures. The first plenary lecture was given by J. Vermant on topic “Advances in interfacial rheometry: from plateau over Gibbs to today”. It is an excellent overview of interfacial rheometry. The particles like proteins, polymers or amphiphilic molecules will accumulate at interfaces and fundamentally change the properties. The interface may then become – in itself – a complex fluid with a pronounced rheological response. He described sensitivity of methods for shear rheometry has been improved by a careful selection of the measurement probe. For example, magnetic rod rheometer and double wall ring device. The second plenary lecture was given by Professor N. J. Wagner and was entitled “Microstructure and rheology of shear banding and shear induced phase separating wormlike micellar solutions”. This was a great overview of the origins of shear banding and shear induced phase separation in micellar solution like materials. He also showed how SANS (small angle Neutron scattering) and Rheo-SLAS could give a great insight into these cationic surfactants like systems. He showed that shear banding is associated with increased segmental alignment of the worm like micelles

accomplished by a flow induced concentration gradient, while in other, shear banding results from strong density fluctuations associated with surfactant network formation. He also demonstrated how the combination of rheology, flow kinematics and SANS measurements of flow-induced microstructure locally in the flow field can be used to evaluate constitutive equations for worm like micelles. The third plenary lecture was given by H. Watanabe. It was entitled "Components dynamics in miscible blends". He examined the viscoelastic, dielectric and rheo-optical for miscible blends like high-M cis-polyisoprene (PI) and poly (p-tert-butyl styrene) (PtBS). He also described effect of temperature on these miscible blends. At higher temperature, the blend exhibits two steps plateau of the storage modulus at high and low angular frequencies, respectively. The complex modulus of the blends as well as the rheo-optical data in high angular frequency plateau zone could be well-described by a simple bending law of the components moduli. At low temperature, the blend exhibits the Rouse like behaviour of storage and loss moduli in the range of angular frequency where high angular frequency plateau was supposed to emerge. This lack of high angular frequency plateau was attributed to retardation of Rouse equilibrium of the PI chain within the entanglement length due to hindrance from slow PtBS chains. The Rouse equilibrium time was just moderately shorter than the dielectrically determined terminal relaxation time of PI. Thus, the high angular frequency plateau zone was too narrow to be resolved experimentally and the PI chains relaxed almost immediately after their Rouse equilibrium (retarded by PtBS).

I gave a talk at the meeting of Society of Rheology entitled "Rheology of rennet curd made from buffalo milk: A comparison with cows' milk". This work was done to describe the some rheological and microstructural differences between bovine milk. Curd rheology was quite different due differences found in fat globule and casein micelles. I received a lot of interesting comments that will undoubtedly help me in preparation of a manuscript to disseminate my research results. I also enjoyed a large number of industrial exhibitions and very friendly atmosphere of the conference. I went there alone and this really drove me to talk to people! I met many interesting people and gained very good experience. I would like to thank the British Society of Rheology for kindly awarding me a travel grant, which made my trip to Suzdal possible.

Imtiaz Hussain
Department of Food and Nutritional Sciences
University of Reading

Report on the 20th Nordic Rheology Society Annual conference

After the success of the AERC conference in Gothenburg last year, the Nordic Society returned to its annual format of conferences, which circulates around the member countries. Finland was the host this year and more specifically the Department of Chemistry of Helsinki University, where the principle organiser Sami Hietala and the NSR board welcomed some 100 delegates to a sun drenched event. The temperatures may have been un-seasonally high, in the low 30's, but the event passed coolly with a number of key speakers such as Gerry Fuller (Stanford University), Peter van Puyvelde (Leuven University) and Tatiana Budtova (Mines ParisTech) presenting an interesting and varied topics in the field of rheology. The theme of "Polymer solutions, suspensions and melts" attracted some 65 presentations, 27 poster entries, a large contribution from a substantial Korean delegation, as well as a host of the usual exhibitors. However, along with the impressive parallel session of oral presentations, the thing that strikes any attendee is the very informal and friendly environment, that not only saw academics and industrialist mix in the conference venue, but even in a traditional social event at the conference dinner, a Finnish sauna on a small Island close to the centre of Helsinki.

Mr Peter Hodder
TA Instruments Ltd

Commentary on the 332nd Council Meeting of the BSR

The Castle at Portmeirion, 20th April 2011

The 332nd meeting of BSR Council was held in the Castle at Portmeirion immediately following the 20th anniversary meeting of the University of Wales Institute for Non-Newtonian Fluid Mechanics. I attended as the first official past-president and it was quickly decided by all others present that my first duty should be as writer of the commentary.

In contrast to last year's meeting – held in the midst of a blizzard at Lake Vyrnwy, this year we were treated to warm spring sunshine. With a new president (Bill Frith) and secretary (Simon Cox) at the helm there was spring-like feel of renewal about BSR council. Some things, however, remained the same – the search for the sandwich lunch and the discussion of the relationship with the European Society as an unexpected opening item on the agenda. This year's discussion had been prompted by an earlier conversation between the president of the ESR and the current and past presidents of the BSR during the coffee break earlier that day. The issue concerned whether ESR should continue as a grouping of national and regional societies or become a society with individual membership. The consensus of those present was that we wished to keep the current federal structure, and the discussion switched to how to accommodate countries with small numbers of rheologists that find it hard to maintain a national society. In common with other issues of European integration, no conclusion was reached – as it was felt that opinions of absent members of Council should count, so it was agreed to continue by email.

With this out of the way we continued with the published agenda. The officers' reports were generally brief as they had just reported to the AGM the day before, which brought us to the problem of where to hold next year's AGM. With no Institute of Wales meeting in spring 2012, (the usual venue for the AGM) and no other suitable meeting on which to attach the AGM, another solution was required. Two alternatives were discussed: an invited lecture from a distinguished rheologist followed by the AGM, or to combine the AGM with a meeting of the Non-Newtonian club. Finally we decided to combine these two ideas into a one day meeting and hold a NNC meeting with an invited lecture and the AGM around Easter.

Travel awards provided an example of how ideas develop through discussion. The starting point was the timing of student travel award requests for students wanting to attend the ICR in Portugal in 2012 with respect to the rule requiring awardees to have been BSR members for nine months prior to their application. Through

discussion this gradually evolved into a special scheme of competitive travel awards to ICR 2012 open to all students registered at a UK university.

After a discussion of the press pack and the website we moved onto future meetings. The next two midwinter meetings will be in London in 2011 (organised by Helen Wilson and Oliver Harlen) and in Aberystwyth in 2012, and suggestions for 2013 were discussed. It was also discovered that the next 3 meetings of the British Applied Mathematics Colloquium will be hosted by rheologically active maths departments (in UCL, Leeds and Cardiff respectively), providing the opportunity to raise the profile of Rheology within applied mathematics.

Finally we agreed that the next Council meeting should be extended to an “away day” to allow more time for discussion of the future direction of the BSR, such as how the we can develop the website.

Oliver Harlen
Past BSR President



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The Non-Newtonian Club (NNC) is an informal rheology discussion group which provides low-cost, informal, one-day meetings which provide an excellent forum for industrial and academic rheologists to meet together informally to present work in progress, raising key needs and concerns, and discussing unresolved practical and modelling issues that may be inhibited at more formal conferences. The agenda of the most recent BSR NNC meeting and the corresponding abstracts can be found at <http://innfm.swan.ac.uk/bsr/frontend/nonnewtonianclub.asp>.

The Non-Newtonian Club Meetings are held 2 - 3 times a year and provide a forum for those practicing rheology to meet. Presentations (typically 20-30 minutes) are made by academic and industry-based scientists, as well as young scientists, presenting on a range of topics that involve rheology in a relatively informal and friendly environment. To encourage phd students and 'young' scientists to present, we offer an award for the best presentation from phd students or 'young' scientists. We endeavour to keep these meetings free. Should you wish to host, sponsor, or participate in such an event, please let me know.

Attendance is free of charge and includes tea/coffee and lunch. The best young speaker will receive a prize sponsored by Anton Paar. Next meeting on Emulsions to be held in early November 2011 in London. Further meeting on Gels and Thickened Systems will take place in March 2012 in Manchester. For further information visit the BSR website or contact Dr Bettina Wolf at bettina.wolf@nottingham.ac.uk.

Bettina Wolf
Industry and Non-Newtonian Club Coordinator

BSR 2011 Midwinter Meeting
Complex Flows of Complex Fluids
December 19-20, 2011
University College London

The 2011 BSR Midwinter Meeting aims to provide an overview of the current research across the whole spectrum of complex fluids in complex flow situations - encompassing theory, simulations and experiments.

Confirmed keynote speakers include:

- * Prof. John Hinch (University of Cambridge)
- * Prof. Malcolm Mackley (University of Cambridge)
- * Prof. Dr. Christian Wagner (Saarland University)

Contributions for oral and poster presentations are invited. For more information, please see the BSR website: <http://bsr.org.uk/meetings.asp> for further information about the meeting and about abstract submission.

Registration is open now through the website: there is an early bird discount for those registering before October 15th 2011.

Dr Oliver Harlen
O.G.Harlen@leeds.ac.uk

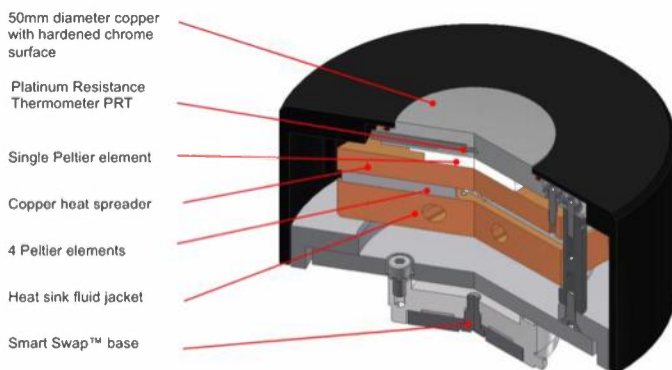
Dr Helen Wilson
Helen.Wilson@ucl.ac.uk

INDUSTRY NEWS

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The Dual Stage Peltier Plate is an addition to our extensive SmartSwap™ temperature module range and is a system that is optimised for low temperature measurements. Though it still offers the same maximum temperature of 200°C of all our other Peltier plates, it is possible to also attain temperatures as low as -45°C, whilst using a simple temperature controlled circulator with fluid at 1°C. The stacked array of the dual stage peltier elements, means that the second, lower stage, is the heat sink for the upper peltier, and as such means that the extremely low temperatures can be reached much quicker as well as negating the need to use expensive refrigerated fluid circulators.



Anton Paar

Ex-Demo Rheometry Equipment

Numerous ex-demo rheometers and accessories will be available from the end of July onwards including the following :

MCR501 (air bearing rheometer for rotational & dynamic measurements)

MCR301 (air bearing rheometer for rotational & dynamic measurements)

RheolabQC (mechanical bearing rheometer, rotational measurements)

CTD600 (Convection oven for MCR type instruments)

P-ETD400 (Electrically heated platens for MCR type Instruments)

Various Peltier Plates and measuring systems

Rheology Workshop at Bradford University, 23rd-24th November

Our July workshop at the University of Nottingham has been full for some time so we are now taking bookings for our next Rheology Workshop which will run at the University of Bradford. This course is a great introduction to the subject for anyone new to rheology or for those looking to further their basic knowledge of the subject. The course incorporates both theory and practical sessions and costs only £399. This price includes “The Rheology Handbook” by course tutor Thomas Mezger (which retails at £100 online).

Rheology Handbook by Thomas Mezger

The 3rd edition of this extremely popular book is now available from Anton Paar. Over 400 pages explain the fundamentals of modern measurements using a rotational rheometer as well as the associated theory. The handbook also includes guidelines for practical measurements using the latest instrumentation and accessories. An invaluable reference source for any student involved with rheology, cost £95+vat. (This book is also available on Amazon, but make sure you get the 3rd edition with additional chapters)

For further information on any of the above please contact steve.goodyer@anton-paar.com or for further information visit www.anton-paar.com

2011		CONFERENCES & MEETINGS
4-6 July London UK	UK Colloids 2011: An International Colloid and Surface Science Symposium http://www.ukcolloids2011.com/	
7-9 Sept Caparica Portugal	IbeReo 2011 – Rheology Trends: from Nano to Macro Systems Maria Teresa Cidade Conference website: http://www.fct.unl.pt/ibereo2011	
9-13 Oct Cleveland Ohio, USA	83rd Annual Meeting of The Society of Rheology Organiser: The Society of Rheology http://www.rheology.org	
6-10 Nov Rio de Janeiro Brazil	Viscoplastic Fluids: from Theory to Application Paulo R. De Souza Mendes Conference website: http://web.me.com/mnaccache/VPF2011	
19-20 Dec London	BSR Midwinter Meeting on Complex Flow of Complex Fluids Oliver Harlen and Helen Wilson Conference website: http://www.bsr.org.uk/index.asp	
2012		CONFERENCES & MEETINGS
5-10 August Lisbon Portugal	The XVIth International Congress on Rheology Organiser: João Maia, Case Western Reserve University http://www.rheology-csr.org/ICR2012	
2011		COURSES & WORKSHOPS
13-14 July Nottingham UK	Rheology Workshop Steve Goodyer, Anton Paar Ltd, 13, Harforde Court, John Tate Road, Hertford, SG13 7Q T: +44 (0)1992 514730; F: +44 (0)1992 514739 E: steve.goodyer@anton-paar.com	
20-21 Oct Crawley UK	Basic Rheology Course For further information, contact Olivia Gibson; TA Instruments, Fleming Centre, Fleming Way, Manor Royal, Crawley, West Sussex, RH10 9NB; T: +44 1293 658900; F: +44 1293 658901; e-mail: Olivia.gibson@taeurope.co.uk	
23-24 Nov Bradford UK	Rheology Workshop Steve Goodyer, Anton Paar Ltd, 13, Harforde Court, John Tate Road, Hertford, SG13 7Q T: +44 (0)1992 514730; F: +44 (0)1992 514739 E: steve.goodyer@anton-paar.com	
2012		COURSES & WORKSHOPS
15-18 May Glasgow Scotland	PROCESS RHEOLOGY: For further information, contact Dr N E Hudson, Dept of Pure & Applied Chemistry, University of Strathclyde, 295 Cathedral Street, Glasgow G1 1XL. Tel: +44 141 5482162; Fax: +44 141 5484822; e-mail: n.e.hudson@strath.ac.uk	

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