

Fifth BSR Non-Newtonian Club Meeting Held in Edinburgh¹

The most recent meeting of the Non-Newtonian Club (NNC), organised by the British Society of Rheology (BSR) for the fifth time, was held in the Centre for Science at Extreme Conditions in Edinburgh on Thursday July 3rd 2008. It was hosted by Job Thijssen from the School of Physics and Astronomy, The University of Edinburgh. These NNC meetings are held at least twice a year and are intended to provide a relatively informal forum for those practising rheology to meet. This time, approximately 35 people attended the meeting, some of them being from as far South as Liverpool and London or as far West as Dublin!

After some coffee, tea and biscuits, especially for those who were in need of a kick-start, it was BSR President Phil Banfill (Heriot-Watt University) who kicked off the meeting with a few introductory words, with which he emphasised the importance of applicable rheology. He reminisced that one of the reasons to set up the NNC meetings was to promote applicable rheology by bringing together people from both academia and industry. The next speaker, Nicholas Hudson from Strathclyde University in Glasgow, continued along that track by discussing the importance of extensional or elongational deformation rather than shear deformation in industrially important processes. Not only did his talk lead to considerations on what word for 'extensional' to use on which continent, it also showed that some of the rheology apparatus that is developed by academics does get commercialised, though it may take a few years before one can buy it off the shelf.

Next up was Denis Weaire from Trinity College Dublin. He showed some results, mainly from simulations but supported by some really nice experimental movies, on the rheology of 2D foams. He explained that one of the major differences between 2D and 3D foams is that 2D foam has an extra feature, namely the drag on the containing walls. His talk invited the audience to reconsider the importance of constitutive relations and whether it is relevant at all, from a practical point of view, to look for general constitutive relations. The last speaker of the morning session was Oliver Henrich (University of Edinburgh), who started by introducing the framework of Mode Coupling Theory and an extension that has recently been developed to include systems under steady shear. He showed some results for a 2D hard disc fluid in plain Couette flow, predicting a distortion of the static structure factor. When asked whether it would be worthwhile to perform (challenging) experiments in 2D to confirm this prediction or whether it would be more sensible to wait for 3D simulations, the speaker replied that the latter would probably make more sense, which seemed to be the consensus among the experts in the audience as well.

Of course, all this food for thought demanded some actual food - lunchtime! It was generally agreed upon, perhaps even unanimously, that lunch was terrific. Thus, a big thank you to TA Instruments for sponsoring the catering. Needless to say that this tasty break was an excellent excuse to meet up with old colleagues or to meet some new people.

All carbohydrate reserves replenished, the audience was ready to take on the first half of the afternoon session, which started with a presentation on micro-rheology by Andrew Harrison (University of Edinburgh). He showed that it is possible to measure the viscosity of colloidal systems by dragging a single colloid through it using optical tweezers. There appeared to be a very decent match between micro-rheology and simulations. The session was continued by Volfango Bertola (University of Edinburgh), who discussed a subject of both academic and practical interest – the impact of a liquid drop on a solid surface. Apart from being relevant, the results presented were also highly entertaining, as several movies of sticking, bouncing and splashing droplets on heated and non-heated surfaces were projected onto the screen.

As some pharmaceuticals are applied to the skin as creams, it is no surprise that rheology is an important aspect in pharmacy as well. This was confirmed by Kalliopi Dodou from the University

¹ The agenda of the most recent BSR Non-Newtonian Club (NNC) meeting and the corresponding abstracts can be found on the NNC website at <http://innfm.swan.ac.uk/bsr/frontend/nonnewtonianclub.asp>

of Sunderland (see Fig. 1), who talked about transdermal patch systems. She explained that it would be useful to incorporate drugs in the adhesive layer of the patch instead of in a separate layer. Subsequently she showed results on the determination of viscoelastic parameters of high and low tack silicone adhesives both before and after the incorporation of drugs. Since some people may have been craving for caffeine near the end of this rather long session, Lucio Isa from The University of Edinburgh did a valiant and successful attempt at getting the audience excited about his research on the capillary flow of concentrated colloidal suspensions. His results clearly demonstrated that a combination of rheology and confocal microscopy can be a very powerful tool, even for high shear rates, for which particle tracking becomes non-trivial. In the very last talk of the meeting, his colleague Rut Besseling used a similar combination of cone-plate rheometry and microscopy to study slip and flow of colloidal hard-sphere glasses. What was especially striking in his presentation was the crucial importance of the nature of the boundary conditions, i.e. whether smooth or rough walls were used in the experiments.

Following Lucio's talk, there was a refreshing cup of tea and some sugar in the form of cookies. Once back in the seminar room, Jason Stokes (Unilever) took the floor. As the NNC meetings are a relatively informal forum, they are also an excellent opportunity for young researchers to present their work, which the BSR tries to encourage by offering an award for the best presentation by a PhD student or young scientist. This year, it was agreed upon by the jury that the prize should go to Oliver Henrich from The University of Edinburgh. He managed to present a clear and coherent story about his results obtained using Mode Coupling Theory (MCT), which is challenging as MCT is a rather technical and complicated subject. In addition, he had perfectly timed his presentation, which is a very useful skill at conferences! Fig. 2 shows Jason congratulating Oliver with his award and the corresponding prize – a copy of the *Rheology Review* series (2003-2007).

After the award ceremony, it was up to Amanda Wright from Strathclyde University to get the audience back on track with her contribution on an optical trapping technique for measuring the viscosity of the vitreous humour. Although her results were fairly preliminary, she could already show that there is a significant difference in the viscosity of fresh and frozen vitreous samples. Although some of the concepts of micro-rheology had already been introduced in an earlier talk by Andrew, it became quite clear that studying vitreous humour is a different ballgame. For example, one of the questions from the audience set off an intriguing discussion on sample preparation, which involved rabbit eyes and a hook. Fortunately, with a modest amount of foresight, the organisers had decided to put Amanda's talk after lunch.

In short, this fifth BSR NNC meeting brought together researchers who practise rheology, both from industry and academia, both experienced and slightly less experienced, which is what these meetings are all about. There was a good mix of presenters, whose contributions led to many open and interesting discussions. Moreover, the excellent food that was offered during lunch provided the right atmosphere for catching up with old colleagues and for meeting some new people as well.

The next NNC meeting will be held mid-October 2008. It is to be hosted by Serafim Bakalis (s.bakalis@bham.ac.uk) at the University of Birmingham. If you would like to sponsor this event, please contact Jason (Jason.Stokes@unilever.com). Anyone who wishes to present at the upcoming NNC meeting should contact either Jason or Serafim. Please note that contributions are welcome from all those that practise rheology – experimentalists, simulators, theorists (alphabetical order), whether from industry or academia, whether experienced or not.

Job Thijssen
Edinburgh, August 1st 2008



Figure 1: Kalliopi Dodou from the University of Sunderland tells the audience about the importance of rheology in patches for drug delivery.



Figure 2: Jason Stokes (right) congratulates Oliver Henrich (left) from The University of Edinburgh with his 'young researchers award'.