

User Seminar of 2D and 3D Rheology of Fluids and Liquid Interfaces

MAY 6–8, 2008

POTSDAM, GERMANY

The second event of a new series of user seminars, dedicated to the rheology of structured bulk phases and two-dimensional interfacial layers, was organised by Anton Paar Germany GmbH (Ostfildern, www.anton-paar.com) and SINTERFACE Technologies (Berlin, www.sinterface.com). After the first seminar was held 2007 in Berlin-Adlershof [1], the meeting venue was chosen this time in the conference hotel “Am Templiner See” in Potsdam [2], specialised in hosting meetings of different size, from small workshops to big conferences. The hotel provides lecture halls and all technical equipment as well as housing and all kind of services for a successful organisation of such type of workshops.

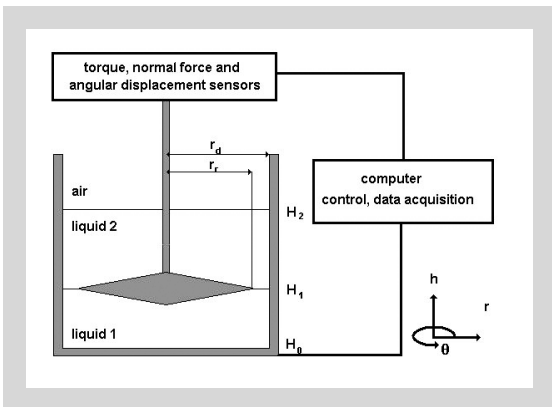
The second user seminar started with a half day training on the basics of 2D and 3D rheology, presented by experts of Anton Paar and SINTERFACE. This included an introduction into interfacial science of liquid interfaces in general and of mechanical properties of interfacial layers under

shear or dilation/compression. The basic knowledge on bulk rheology consisted of lessons on measurements in rotation and oscillation mode using various types of rheometer. This training course was essentially organised for beginners, however, almost all participants participated in it.

During the second and third day of the seminar lectures were given by experts of the two organising companies A. Paar and SINTERFACE and guest lecturers of the TU Berlin, ETH Zurich, the MPI of Colloids and Interfaces in Potsdam, and from industrial research departments of Nestlé, BASF and Schwan-STABILO. The 45 participants (see photo of Fig. 1) came from academic and industrial research institutions in Austria, Germany and Switzerland, so that all lectures were given again in German.

The seminar provided an introduction into the professional application of measuring instruments in bulk rheology when using them in rotational (P. Heyer, Ostfildern) or oscillatory modes

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lems, however, demonstrates the close link between the 2D and 3D rheology.

After a general introduction into 2D rheology a number of experimental tools were presented and few selected application, essentially from food technology, discussed. The shear rheology was explained (J. Krägel, Potsdam) and the advantages and disadvantages of the existing experimental set-ups discussed. For studies of the interfacial rheology under compression and expansion as the main second type of interfacial deformation (R. Miller, Potsdam) most of all principles based on drops and bubbles were presented. A book on interfacial rheology is in preparation and will be published in the end of 2008 [3].

One of the highlights of the seminar was the fact that due to the high sensitivity modern rheometers can be applied to interfacial shear rheological studies with only a small modification. It was shown that modern rheometers can be equipped with an interfacial tool and successfully applied to studies of interfacial layers. In this way, the interfacial shear rheometers with free damped oscillations, which are very sensitive to low shear viscosities, can be successfully complemented by equipment working for systems of higher interfacial shear viscosities. The extremely small deflection angles provided for example by the MCR-301-ISR ensure that interfacial structures are analysed but not broken during the experiments. In Fig. 2 the schematic of interfacial shear rheological experiments is shown.

Accurate 3D rheology experiments proved to be very useful for the structural analysis of visco-elastic solutions. The shape and size of surfactant micelles have a direct impact on the visco-elastic behaviour of aqueous solutions (M. Gradzielski, Berlin). M. Schmitt (Heroldsberg)

Figure 1 (above): Participants of the 2D/3D rheology seminar in front of the steamer "Gustav", on which the participants of the seminar made an excursion on the rivers and lakes of Potsdam.

Figure 2: Principle of a shear experiment at the interface between two liquids.

(M. Schäffler, Ostfildern). Special features of rheo-optical methods were explained as the combination of rheometers with various optical sensors such as microscopy, small angle and wide angle light scattering, X-ray scattering and others (H. Schnablegger, Graz). It could be demonstrated that the innovative combination of rheological techniques with modern observation techniques provide a large variety of new practical applications in science and technology.

Most of the materials applied in modern technologies are of composite character. For example, emulsions, foams and dispersions (or combinations of them) are typically treated like a homogeneous material, although composed of subunits having their own mechanical behaviour. In emulsions under stress in rheological experiments of rotation or oscillation deformation, for example, the droplets are deformed and thereby the droplet surfaces compressed/expanded or sheared. The impact of these interfacial deformations onto the overall response of the complete emulsion systems has not yet been fully analysed and understood. This type of prob-

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demonstrated the possibilities and limits of a rheological analysis of emulsions, suspensions and gels when combined with Kryo-REM. M. Ranft (Ludwigshafen) discussed the relevance of the rheological behaviour for the control of production stability and for the quality of final products in modern technologies, such as coating of paper with polymer dispersions.

Rheological studies of complex fluids in food processing were the topic of contributions by a group of authors. J. Engmann (Lausanne) showed the role of rheology in characterising the texture of food products and on the sensory perception by customers. B. Senge (Berlin) gave an overview on structure formation and stability in food stuff. In the two presentations by P. Fischer (Zurich) and M. Leser (Lausanne) it was demonstrated how interfacial and bulk rheology meet each other in processing technologies of the food industry.

The two case studies, representing the practical situation engineers can face in their daily work, were also a new part of the seminar. The first case study dealt with "controlling chocolate viscosity" guided by J. Engmann from Nestlé Research Centre in Lausanne, while the second case study was dedicated to "cosmetic w/o emulsions" presented by M. Schmitt from Schwab-STABILO Cosmetics in Heroldsberg. Both topics allowed the participants to apply the learned lessons to practical situations, supported by the

experts who guided the groups through the problems to different solutions.

Significant time was also dedicated to the presentation of equipments and for test measurements of practical systems on bulk and interfacial rheology (including shear and dilational deformations). The third seminar of this type is scheduled for autumn 2009 in Potsdam (details will be available in due time via

www.sinterface.de/Anwenderseminar2D-3D-Rheologie.html).

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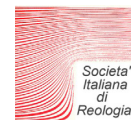
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- [1] Schäffler M, Miller R, User Seminar of 2-D and 3-D Rheology of Fluid Systems, Appl. Rheol. 17 (2007) 164.
- [2] http://www.tagungshotel.com/hotel_109205_0152.htm.
- [3] Liggieri L, Miller R (Eds.): Interfacial Rheology, Brill Academic Publication, in preparation.

Conference Report IV

The 10th Conference of the Italian Society of Rheology

RAVENNA, ITALY
MAY 18–21, 2008



This 10th Italian Conference on Rheology, 18 – 21 May in Ravenna, marked a continuing success for one of the traditions of the Italian Society of Rheology (currently under the guidance of Bruno de Cindio, Università della Calabria), providing rheologists and material engineers with an opportunity to discuss about the latest research of this area. The symposium included sessions on fundamental and applied rheology, polymer melts and solutions, polymer blends and composites, emulsions, suspensions, food rheology and bio-

materials, instrumentation and numerical simulations. The aim of these conferences is to bring together the rheology community and to strengthen the cooperation among the research groups. It was felt by all participants that this framework, bringing together participants from a wide range of applications who do not normally work together was very successful.

This year's conference also marked the debut of an organizing committee of industrial affiliation, namely scientists from Polimeri

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Applied Rheology
Volume 18 · Issue 5

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