Lorentz Center Workshop: Dynamics of Complex Fluid-Fluid Interfaces

Leiden, The Netherlands
26 – 30 September, 2011

The Lorentz Workshop on 'Dynamics of Complex Fluid-Fluid Interfaces' was a great success, with many participants commenting that they found the experience highly rewarding. Over the course of five days, 22 talks were delivered by attendants from over 12 different countries. The topics presented were roughly evenly divided between experimental characterization, theoretical methods, and simulation, but shared a common focus on modern techniques for probing, characterizing, and predicting interfacial structure and dynamics. Several of the speakers commented on the exciting overlap observed between their work and other research presented at the workshop, inspiring ideas for future collaboration.

The workshop also provided a great opportunity for the 11 graduate students and post-docs present to gain exposure to more senior researchers in their field. In addition to presenting their posters to the group on Monday night, these young researchers were given the assignment of 'interviewing' more senior participants and coming up with several questions to address during the plenary discussion held mid-week about the most pressing challenges addressing the field of complex interfaces. Amongst the issues addressed during this plenary discussion was the difficulty of accurately probing highly elastic films at interfaces (consisting of proteins, particles, etc.), for which it is particularly difficult to find a linear response regime using current techniques. The argument was made that although techniques such as capillary pressure allow one to achieve reproducible results for a given system, it is important to distinguish between "real" and "apparent" values, particularly for measurements such as the dilatational moduli of highly viscoelastic surfaces. Discussion participants also expressed a desire for real, powerful constitutive laws for materials at an interface. Although such laws are well-developed in the field of bulk-rheology, the field of complex fluid interfaces lacks a similarly robust set of laws that can be used to model and predict interfacial structure and dynamics. Finally, some comments were made about the desirability of a few "model interfaces" which could be utilized as reference systems by all labs working in this field. These could be used, for example, to compare the interfacial properties measured using different rheological techniques. It was suggested that such models would ideally exemplify the two extremes of a purely Newtonian and purely elastic interface. While a purely Newtonian case is fairly easy to agree upon (a clean air-water interface), there is still a need for an inexpensive, highly elastic model that can be used as a standard by the community (many elastic interfaces consist of biological samples such as proteins that would be poor standards due to the variability in purification, etc.). The group was charged with brainstorming ideas for such model systems that could be used in the future.

The workshop schedule also allowed time for socialization and cross-talk between participants, fostering a greater understanding of what everyone's areas of specialization were. A number of discussions focused on potential new collaborations to address some of the big questions facing the study of interfacial structure and dynamics. At a summary meeting, participants expressed a desire to hold a follow-up meeting in the future, with a tentative goal date of September 2013. The general consensus was that such a meeting should take place in a similarly intimate working environment and with a relatively small group size of no more than 70-80 participants, in order to foster interdisciplinary collaboration and prevent the plenary discussions from becoming unwieldy. A committee of four persons agreed to spearhead the effort of brainstorming a specific time, location, and format for this next meeting.

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