Amherst Rheology Course 2019 (ARC19)

Synergy of Experiment with Theory in Rheology

Location of Short Course: Conference Venue of AERC 2019, Portoroz, Slovenia

Lectures by:

H. Henning Winter, University of Massachusetts, Amherst, MA/USA,
Email: winter@umass.edu
Manfred H. Wagner, Technical University Berlin, Berlin / Germany
Email: manfred.wagner@tu-berlin.de
Ole Hassager, Technical University of Denmark, Lyngby/ Danmark
Email: Ole Hassager <oh@kt.dtu.dk>

Objective of Course:

A quantitative approach to rheology is presented and taught in tutorials: handling of data from rheological experiments, plotting, overlay, extraction of material parameters, modelling with theory, data storage and retrieval and more. On two parallel screens, short lectures on rheology fundamentals will be combined with hands-on tutorials. This will generate an interdisciplinary group experience of discussing rheological experiments and theory and application. On the first day, participants will master rheology on a quantitative level and also will learn the underlying concepts that lead to the quantitative results. Most of first day's focus is on linear viscoelasticity. The second day has a strong focus on non-linear viscoelasticity and the underlying theory. Continued tutorials at the end of the second day will allow participants to see the rheology of their own materials in new ways, discover, and draw quantitative results. Experiment and theory are well integrated in the new teaching tools of the course.

Teaching Tool:

The two screens in parallel have the purpose of directly converting the taught material on the first screen into quantitative answers on the second screen. Participants will learn to merge experiment with theory graphically on their own PC. The hands-on rheology practice is supported by the IRIS software as teaching tool, which we will install on all PCs. Participants are requested to bring their own Windows-based PC so that they can participate in the many "hands-on" tutorial projects. The user-friendly IRIS platform allows exploration of the newest developments in rheology.

Schedule and Course Content

Day One - Sunday, April 07, 2019

8.00 Registration and General Computer Startup (Winter, Wagner)
8:30 Opening (Winter)
8:45-9:15 Introduction to Rheometry (Winter)
9:15-10:00 Introduction to the IRIS platform (Winter)
10:00-10:20 Coffee Break
10:20-11:05 Steady Shear Material Functions (Winter)
11:05-11:50 Linear Viscoelastic Experiments (Winter)
11:50-1:30 Lunch Break
1:30-2:15 Rheological Constants and Material Functions (Winter)
2:15-3:00 Filament Stretching Rheometry: Basic Concepts. (Hassager)
3:00-3:15 Coffee Break
3:15-4:00 Rheology of Model Polymers and Synergy with Theory (Winter)
4:00-4:45 Data Handling: Input, Output, Editing, Graphing, Storing (Winter)
4:45-5:00 Discussion (group)

Day Two - Monday, April 08, 2019

8:30 General Computer Startup (Winter)
8:45-10:00 Molecular Stress Function, Basic Concepts (Wagner)
10:00-10:20 Coffee Break
10:20-11:05 Molecular Stress Function, tutorial (Wagner)
11:05-11:50 Extensional rheology of model polymers: Solutions and melts. (Hassager)
11:50-1:30 Lunch Break
1:30-2:15 Gels and Soft Glass - Time Resolved Rheometry
2:15-3:00 MAOS – The Better Part of LAOS (Wagner)
3:00-3:15 Coffee Break
3:15-4:00 Hierarchical Multi-Mode MSF Model (Wagner)
4:00-4:45 Improv (data of participants) ;
Molecular Weight Distribution from *G*',*G*" (Nobile/Cocchini model);
Recent Developments (Winter)
4:45-5:00 Discussion
5:00 End of Course