Introduction to the Rheology of Complex Fluids

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This module contains PowerPoint presentations aimed at providing the necessary background to understand, perform and interpret experimental rheological characterization of complex fluids. An overview of rheology is presented in the first part. Next, the available instrumentation and typical flows are presented and discussed. The last part focuses of the analysis and exclusion of errors from experimental data. Both shear and elongational flows are presented.

An overview of the topics to be covered in each section is:

1. **Introduction to the Rheology of Complex Fluids** (27 slides)

   Definition of rheology, examples, rheology's goals, rheology as an interdisciplinary science, properties, common non-newtonian behavior and phenomena

2. **Rheometry** (63 slides)*

   Difference between viscometer and rheometer, rotational rheometry (parallel plates, cone & plate, & Couette), capillary flow, extensional rheometers

3. **Material Functions** (60 slides)*

   Definition, material function for shear flow (steady-shear, unsteady, decay, growth, & SAOS), material function for elongation flows

4. **Data Collection and Analysis** (50 slides)

   Errors, entrance & exit effects, wall slip, incorrect length scales, flow history, edge fracture, drying and evaporation, disalignment, instabilities, bubbles & contaminants.

* These sections draw heavily from the book *Understanding Rheology* by Faith Morrison (Oxford University Press, 2001) an excellent textbook for advanced undergraduate and graduate students interested in rheology. Thus, reading and use of this book is highly recommended or even required for these sections.

Dr. Aldo Acevedo is assistant professor at the Department of Chemical Engineering of the University of Puerto Rico at Mayagüez, P.R. His research interests are in complex fluids, in particular liquid crystal polymers and polymer gels, and their interaction with particles fillers for development of novel multifunctional nanocomposites and new drug delivery mediums.