



Calendar details

Date:	Monday, 21 June 2021
Time:	05:00 pm – 06:30 pm (Melbourne, Australia)
Event registration link:	https://www.eventbrite.com.au/e/australian-society-of-rheology-seminar-21-june-2021-registration-156019192605

Invited lecture

Professor Hans C. Ottinger

(Polymer Physics, Department of Materials, Swiss Federal Institute of Technology -
ETH Zurich, Switzerland)

Presentation Title: Learning from fluctuations in rheology

Abstract: Early rheology was all about finding the form and parameters of constitutive equations for stress tensors. A deeper understanding was eventually achieved by focusing on the evolution equations for the slow structural variables determining the rheological properties of complex, viscoelastic fluids. Such evolution equations can be further enhanced by introducing fluctuations that represent the influence of the fast variables eliminated in formulating the equations for the slow variables. According to nonequilibrium thermodynamics, these fluctuations are deeply related to the dissipative properties of complex fluids.

Fluctuations are not just a tiny correction to the deterministic equations. When there exist long-range correlations, for example due to flow, so-called "giant fluctuations" can arise. Even experimental techniques for measuring rheological properties, such as dynamic light scattering or microbead rheology, are based on fluctuation effects. Fluctuations can become very interesting and important when small subsystems must be considered, say in the presence of interfaces of molecular thickness. Moreover, fluctuations are the key to nonequilibrium statistical mechanics and hence to molecular understanding of rheological properties.

I will try to provide convincing arguments showing that fluctuation-enhanced evolution equations for structural variables are the natural next step in rheology.



Speaker's biography



Professor Hans Christian Öttinger is a Professor of Polymer Physics and Head of the Institute of Polymers at the ETH Zürich. He completed his PhD in Physics at University of Freiburg, Germany and Postdoc in Chemical Engineering at University of Wisconsin–Madison, U.S.A. He has received the Bingham Medal in 2008 and is a Fellow of the Society of Rheology and a Member of the Swiss Academy of Engineering Sciences. He has also served in the Editorial Board for the following journals: Applied Rheology, Journal of Rheology, Multiscale Modeling and Simulation and DYNA.

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