

Rheology and Heat Transfer of non-Newtonian Fluids

Overview

The world is full of non-Newtonian fluids both in nature and manmade categories. Their rheology both at macroscopic and microscopic level plays a significant role in defining its flow and thermal transport behaviour. The influence of time on apparent viscosity variation is complex to achieve and with little accuracy by theoretical models.

Investigations on heat transfer and flow characteristics with non-Newtonian fluids are as old as the studies on their rheology and fluid dynamics, and over the years there have been several reviews on the topic. As with Newtonian fluids, research and the solution of engineering problems on heat transfer and flow friction of non-Newtonian fluids can be carried out experimentally, theoretically and analytically. However, there is an important difference between Newtonian and non-Newtonian studies rooted in the non-linear nature of the latter. Such fluids find applications in chemical processes, cosmetics and food processing, pharmaceutical products and flow dynamics of geophysical materials nanofluids, and hybrid rocket fuels.

Conventional thermo-fluid analysis does not hold good for such systems. Seeding such materials with nano-particles is an efficient way of fine-tuning thermo-fluid capability of these fluids. Mixing of nano-particles significantly changes the rheological properties and enhances the complexity of the problem. It would be interesting to introduce rheology and heat transfer behaviour using experimental and computational analysis techniques. Course participants will learn these topics through interactive lectures and hands-on experiments.

Modules	A: Non-Newtonian Rheology : 08-10 Dec, 2020 B: Thermo-fluid transport of non-Newtonian fluids : 11-12 Dec, 2020 Number of participants for the course will be limited to fifty.
You Should Attend If...	<ul style="list-style-type: none">▪ you are an interested in rheology, flow and heat transport in non-Newtonian fluids. You could be a researcher/scientist/student of Mechanical/Chemical/Material/Chemistry/food processing.▪ you are geologist or geophysicist interested in exploring flow of debris, lava and muds.▪ you are a higher grade student or faculty from academic institution interested in developing understanding on complex fluids. You will get opportunity to explore research issues on complex fluids, its rheology and thermo-fluid transport behaviour.
Fees	The participation fees for taking the course is as follows: Participants from abroad: US \$500 Industry/ Research Organizations: INR 10000 Faculty Members: INR 2000 Students/Research Scholars: INR 1000 The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on nominal payment basis.

The Faculty



Prof Robert J Poole is EPSRC Complex Fluids & Rheology Fellow, The Harrison Chair Professor and Head of Department for Mechanical, Materials and Aerospace Engineering at University of Liverpool, UK. He has active research in viscoelastic fluid flows and rheology, experimental fluid mechanics for turbulent flows and those involving heat transfer. He is editor of Journal of Non-Newtonian Fluid Mechanics.



Dr M A Hassan is a faculty in department of Mechanical Engineering at National Institute of Technology Jamshedpur. His research interest is nanofluids, complex fluid rheology and its thermos-fluid behaviour.



Prof Sanjay is a Professor of Mechanical Engineering at National Institute of Technology Jamshedpur. His research interest is Gas turbine, combined cycle power plants, Energy exergy analysis of complex systems and nano materials application in combustion.

Course Coordinators

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