ME Seminar

How an oil-layer changes the rod-climbing effect

Udita Ghosh, CV Raman Post-Doc Fellow, IISc

ABSTRACT

Here, I will revisit the Weissenberg effect or climbing of a viscoelastic fluid onto a partially immersed rotating rod. In particular, I will delve into the question of whether these rod-climbing fluids would continue their ascent under altered interfacial conditions? To experimentally investigate this, bare rods were replaced by silicone oil dipped rods and the response of the fluid in terms of the maximum free surface deformation was determined. Interestingly, apart from the classical rod-climbing, oily-rods were found to exhibit rod-dipping state for polymeric concentration c $= 0.5$ (w/w%). These three regimes (rod-climbing, rod-dipping, absence of Weissenberg effect) displayed by the fluid as a function of presence/absence of oil, polymeric concentration and rod-rotation velocity will be presented in the form of a heat map. Second, I have been writing a review article (invited) on bacterial streamers. Essentially streamers are filamentous, slender structures that form when biofilms are exposed to sustained hydrodynamic flows. I will outline the pertinent scientific challenges in the domain of bacterial streamers throughout its life-cycle—initiation, maturation and arrest across laminar and turbulent flow regimes.

ABOUT THE SPEAKER

Dr. Udita Uday Ghosh received her Bachelors degree from Laxminarayan Institute of Technology, Nagpur in 2011, followed by Masters and Ph.D degrees from the Indian Institute of Technology, Kharagpur, India in Chemical Engineering in 2013 and 2018 respectively. Her doctoral work focused on the crack formation process in colloidal systems and dynamics of evaporating thin films. Dr. Ghosh joined CNRS, France as a postdoctoral fellow where she worked on manipulation of miscible fluid interfaces. She moved to the Indian Institute of Science in September, 2019, as C.V. Raman Postdoctoral Fellow working with Prof. Aloke Kumar in Mechanical Engineering. Her current research focuses on understanding behaviour of complex fluids like polymeric solutions and bacterial suspensions, under an applied shear.

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