ICTS Skype Seminar

Title : Effect of Viscoelasticity on Droplet-Breakup and Generation in Microchannels : a Lattice Boltzmann study

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Date : Tuesday, July 31, 2018

Time : 10:00 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : I present results based on numerical simulations with the "lattice Boltzmann models" to highlight the non-trivial role played by confinement and non-Newtonian effects in microfluidic geometries. The kinetics of the polymers is introduced using constitutive equations for viscoelastic fluids with finitely extensible nonlinear elastic dumbbells with Peterlin's closure (FENE-P). First, I investigate the dynamics and break-up processes of non-Newtonian droplets in strongly confined shear flows, by characterizing the conditions for the existence of break-up mechanisms in presence of viscoelasticity. We quantify the droplet response by changing the polymer relaxation time, the maximum extensibility of the polymers, and the degree of confinement, i.e. the ratio of the droplet diameter to wall separation. In confined conditions, the critical capillary number of viscoelastic droplet increases or decreases, depending on the maximum elongation of the polymers, the latter affecting the extensional viscosity of the polymeric solution. As an upgrade of complexity, I also study more structured flows in confined geometries, i.e. T-Junction and flow-focusing devices with viscoelastic phases.