Atelier
« Ordre partiel dans les matériaux : analyse, simulations et sujets connexes »
21—30 juin 2016

Workshop
"Partial order in materials: Analysis, simulations and beyond"
June 21—30, 2016

Particle dynamics in nematic liquid flows

Sourav Mondal*

Sourav.Mondal@maths.ox.ac.uk;souravmondal2008@gmail.com

Nematic liquids are the class of the anisotropic complex fluids, featuring the orientational order of the directors (crystals). There is a strong two-way coupling between the flow field and nematic liquid, which is responsible for the distinct ordering of the directors aligning with the flow field, depending on the strength of the external pressure gradient. It is interesting to observe the effects of particle dynamics in such a complex flow field, where there is distortion of the director field due to anchoring on the particle surface and channel walls. The force exerted on the particle is due to the viscous drag by the fluid and the stress due to the gradient in the director field. The talk would include strategies about numerical modeling of such systems, investigating the change in the director orientation with flow Reynolds number. The effects of the anchoring strength, particle size and relative elastic strength to viscous forces play a key role on the dynamics of the particle in the system. The results can be useful in understanding nematic liquid flows in the microchannel and applying it to tune particle transport behaviour in such flow fields.

*Mathematical Institute, University of Oxford, Andrew Wiles Building, Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG, UNITED KINGDOM.