Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Colloquium

On the yielding of solids

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It is widely believed that flow in a crystalline solid can only be induced via the application of a finite stress. As a consequence, in the limit of zero strain rate, the steady-state stress of a deformed solid would not go to zero as in a Newtonian fluid, but it would approach a finite value (the yield stress). This would imply that under the application of an infinitesimal stress the crystalline solid is in a rigid, non-flowing state. However, fundamental arguments show that the appearance of a rigid crystal is a kinetic phenomenon, associated with finite time scales. If one waits sufficiently long, any crystalline solid would eventually flow as a response to an infinitesimal stress. The rigidity of amorphous solids, i.e. glasses, is due to the shift of the Newtonian regime to inaccessible long time scales below the glass transition.

In my talk, I present studies on the yielding of solids under shear, using particle-based simulation techniques. The focus is on glasses as well as supercooled liquids where the response to a mechanical load is solid-like beyond the Newtonian regime.

Thursday, Feb 14th 2019

4:00 PM (Tea/Coffee at 3:30 PM)

Auditorium, TIFR-H