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

Students' Annual Seminar

Pleating of a flat stretched membrane under nonzero temperatures

Debankur Das

We study the emergence of pleats in a stretched two dimensional sheet composed of connected vertices arranged as a regular triangular lattice. We consider only "flat-foldable" pleats i.e. those with all displacements restricted to the two dimensional plane. Pleats occur here as a result of an equilibrium first order transition from the homogeneous sheet to a heterogeneous phase where stress is localised within pleats and eliminated elsewhere. To facilitate pleating, we introduce an external field which couples to local non-affine displacements i.e. those displacements of neighbouring vertices which cannot be represented as a local affine strain. We obtain both zero and finite temperature phase diagrams in the strain-field plane. We show that in the thermodynamic limit the un-pleated state is always metastable at vanishing field for infinitesimal strain.

Thursday, Mar 1st 2018

04:00 PM (Tea/Coffee at 03:30 PM)

Seminar Hall, TIFR-H