**Numerical Study for Defects in Nematic Liquid Crystals: A Discrete Energetic Variational Approach**

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Liquid crystals are classical examples of partially ordered materials that combine the fluidity of liquids with a degree of long-range orientational order. There is substantial interest in defect pattern formation in liquid crystals. However, since the defects are the places where the order parameter of a liquid crystal changes rapidly, it often difficult to do the simulations. In this talk, we present a new numerical approach for simulations of defect in nematic liquid crystals by employing both Eulerian and Lagrangian descriptions of generalized gradient flow system. We derived our numerical methods by a discrete energetic variational approach, which inherits various properties from the continuous energy-dissipation law. Numerical tests show that such methods are adequate to capture the defects in nematic liquid crystals.