



سمینار هفتگی ماده چگال نرم

Multi-defect Dynamics in Active Nematics

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Abstract

Recent experiments and numerical studies have drawn attention to the dynamics of active nematics. Two-dimensional active nematics flow spontaneously and exhibit spatiotemporal chaotic flows with proliferation of topological defects in the nematic texture. It has been proposed that the dynamics of active nematics can be understood in terms of the dynamics of interacting defects, propelled by active stress. Previous work has derived effective equations of motion for individual defects as quasi-particles moving in the mean field generated by other defects. This paper, Vafa et. al. have examined the dynamics of 2D active nematics in the limit of strong order and overdamped compressible flow. The activity-induced defect dynamics is formulated as a perturbation of quasi-static nematic textures explicitly parameterized by defect positions. This makes it possible to derive a set of coupled ordinary differential equations governing defect (and therefore texture) dynamics. In addition to the familiar active self-propulsion of the $+1/2$ defect, we obtain new collective effects of activity that can be interpreted in terms of non-central and non-reciprocal interactions between defects. I will also present some of our own results on the simulation of multi-defect systems.

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مکان (کلاس مجازی آقای دکتر اجتهادی):

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