CUBIC INSTABILITY IN LANDAU-DE GENNES ENERGY FOR NEMATIC LIQUID CRYSTALS

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In the Landau-de Gennes theory to describe nematic liquid crystals, there exists a cubic term in the elastic energy, which is unusual but is used to recover the corresponding part of the classical Oseen-Frank energy. And the cost is that with its appearance the current elastic energy becomes unbounded from below. One way to deal with this unboundedness problem causby is to replace the bulk potential defined as in with a potential that is finite if and only if Q is physical such that its eigenvalues are between $-\frac{1}{3}$ and $\frac{2}{3}$.

The main aim of our talk is to understand what can be preserved out of the physical relevance of the energy if one does not use a somewhat ad-hoc potential, but keeps the more common potential. In this case one cannot expect to obtain anything meaningful in a static theory, but one can attempt to see what a dynamical theory can predict.