

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Effective theory and simulations of Smectic-A liquid crystals

DANILO LIARTE, MATTHEW BIERBAUM, MUXIN ZHANG, BRIAN LEAHY, ITAI COHEN, JAMES SETHNA, Cornell University — We present simulation results of focal conic structures in smectics-A. Smectic-A is a liquid-crystalline state of matter, with long-range orientational order, and a layered structure with liquid-like order within each layer. In experiments it exhibits striking focal conic domains - defect structures forming beautiful ellipses and hyperbolas. We derive dynamical equations for a vector field that is parallel to the layer normal, and whose size is related to the compression of the layers. In our simulations, focal conic structures spontaneously emerge from random initial configurations, and are characterized by several visualization tools that we developed. We study both coarsening and the effects of shear stress in this system, which are compared with experiments performed in Cornell. We also discuss generalizations to include the dynamics of dislocations.

Danilo Liarte
IFUSP- duplicate record

Date submitted: 15 Nov 2013

Electronic form version 1.4