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Defects in liquid crystals in confined geometries: simulation studies[1] SAJEDEH AFGHAH, ANDREW KONYA, ROBIN SELINGER, Kent State Univ - Kent — Using numerical simulations in three dimensions, we study the formation of defect structures in liquid crystals in confined geometries. We model a cholesteric in a microchannel with homeotropic anchoring on four sides and periodic boundary conditions along the channel length. We find that channel aspect ratio and cholesteric pitch control resulting defect structures, and in some cases produce evenly spaced bubble domains. We also performed simulation studies of a nematic liquid crystal confined in a cell with a periodic array of pillars with homeotropic anchoring on all surfaces, and examine formation of a periodic array of defects. To simulate temperature-driven microstructural evolution, we include in our model the temperature dependence of the Frank elastic coefficients and cholesteric pitch, fitted from experimental studies. Computational speed is improved by implementation of our simulation algorithm in CUDA. Simulation results are compared to recent experimental studies by the group of Qi-Huo Wei at Kent State.

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