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S Joo* (sjoo@odu.edu), **A Contreras**, **C Garcia-Azpeitia** and **C Garcia-Cervera**.

Bifurcation study of smectic A liquid crystals in three dimensions.

We study the Landau-de Gennes free energy to describe the undulatory instability in smectic A liquid crystals subjected to magnetic fields. We prove this phenomena by the bifurcation theory to the nonlinear system of Landau-de Gennes model. The bifurcation at the onset of undulation in 3D is not simple. We identify the irreducible representations for natural actions on the functional that take into account the invariances of the problem thus allowing for reducing the bifurcation analysis to a subspace with symmetries. A reduced 2D model provides a qualitative structure of the minimizer. We also perform numerical simulations to illustrate the results of our analysis. (Received September 19, 2016)