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Sawtooth profile in smectic A liquid crystals

We study the Chen-Lubensky free energy functional to understand the zigzag pattern formed in a smectic A liquid crystal in the presence of an applied magnetic field. We identify a small dimensionless parameter ϵ, and investigate the behavior of the minimizers when the field strength is of order $\mathcal{O}(\epsilon^{-1})$. In this regime, we show via Γ-convergence that a sawtooth profile is favored. We also carry out numerical simulations illustrating the zigzag structure. Our mathematical results are consistent with the experimental picture presented in the physics literature. This is joint work with C. J. Garcia-Cervera and S. Joo.