Minimizers of a variational problem for nematic liquid crystals with variable degree of orientation in two dimensions

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Abstract: We study the asymptotic behavior, when $k \to \infty$, of the minimizers of the energy $\mathrm{G}_k(u) = \int_\Omega \left((k-1)|\nabla |u||^2 + |\nabla u|^2 \right)$, over the class of maps $u \in H^1(\Omega, R^2)$ satisfying the boundary condition $u = g$ on $\partial\Omega$, where Ω is a smooth, bounded and simply connected domain in R^2 and $g : \partial\Omega \to S^1$. The motivation comes from a simplified version of Ericksen model for nematic liquid crystals. We will present similarities and differences with respect to the analog problem for the Ginzburg-Landau energy.

Based on a joint work with Dmitry Golovaty.