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**A nonlocal model of inhomogeneous nematic liquid crystals** PETER PALFFY-MUHORAY, Liquid Crystal Institute - KSU, XIAOYU ZHENG, Dept. of Mathematical Sciences - KSU, ROLAND ENNIS, Pressco Technology Inc. Cleveland, OH — The free energy cost of spatial inhomogeneities in nematic liquid crystals is usually described in terms of gradients of the director field or of the order parameter tensor. The origins of such gradient expansions are not clear; they can also lead to ill-posedness of the variational problem of minimizing the free energy. We propose a simple nonlocal form of the single particle potential from which the free energy may be constructed. Our model reduces to the Maier-Saupe form for homogenous systems, but describes inhomogenous systems in general. We demonstrate the validity of the model by using it to describe the electric field induced Fredericksz transition. We discuss the connection between our non-local model and gradient expansions.

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