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Dimension reduction for the Landau-de Gennes model in nematic thin films.

We use the method of Γ-convergence to study the behavior of the Landau-de Gennes model for a nematic liquid crystalline film in the limit of vanishing thickness. In this asymptotic regime, surface energy plays a greater role and we take particular care in understanding its influence on the structure of the minimizers of the derived two- dimensional energy. We assume general weak anchoring conditions on the top and the bottom surfaces of the film. The constants in the weak anchoring conditions are chosen so as to enforce that a surface-energy-minimizing nematic Q-tensor has the normal to the film as one of its eigenvectors. We establish a general convergence result and then discuss the limiting problem in several parameter regimes.