

On the role of the α_1 -viscosity in the Ericksen-Leslie equations with Ginzburg-Landau penalisation and molecular stretching

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The Ericksen-Leslie system is a fundamental hydrodynamic model that describes the evolution of incompressible liquid crystal flows of nematic type. In this talk we present a recent result concerning the general Ericksen-Leslie system with a Ginzburg-Landau type approximation. Up until recently, a fundamental problem that had remained open was the uniqueness of weak solutions. The essential mathematical difficulties of the model arise indeed from highly nonlinear terms and a lack of maximum principle due to the stretching effect of the fluid on the constitutive molecules. In this talk we present a recent result which provides a positive answer to the uniqueness problem of weak solutions in a two-dimensional periodic domain. We introduce a specific toolbox of Fourier Analysis, in order to address the mentioned result.