UNIVERSITÀ DI PARMA

Dipartimento di Scienze Matematiche, Fisiche e Informatiche

Seminario di Analisi Matematica

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Torus-like solutions for the Landau de Gennes model

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Abstract: *we report on some recent progress (in collaboration with F. Dipasquale and V.Millot) about the study of global minimizers of a continuum Landau-De Gennes energy functional for nematic liquid crystals in three-dimensional domains. First, we discuss absence of singularities for minimizing configurations under norm constraint, as well as absence of the isotropic phase for the unconstrained minimizers, together with the related biaxial escape phenomenon. Then, under suitable assumptions on the topology of the domain and on the Dirichlet boundary condition, we show that smoothness of energy minimizing configurations yields the emergence of nontrivial topological structure in their biaxiality level sets. Then, we discuss the previous properties under both the norm constraint and an axial symmetry constraint, showing that in this case only partial regularity is available, away from a finite set located on the symmetry axis. In addition, we show that singularities may appear due to energy efficiency and we describe precisely the asymptotic profile around singular points. Finally, in an appropriate class of domains and boundary data we obtain qualitative properties of the biaxial surfaces, showing that smooth minimizers exibit torus structure, as predicted in numerical simulations.*

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