

Courses 2016-17

BCAM Mazarredo 14 ,48009 Bilbao, Basque Country, Spain

June 05-09, 2017, 9:30-11:30 h

(5 sessions, a total of 10 hours)

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INTRODUCTION TO THE MATHEMATICS OF LIQUID CRYSTALS

The mathematics of liquid crystals is a hot topic of interest currently to scientists from mathematics, physics and chemistry. Its mathematical study involves a fascinating and non-standard mixture of various mathematical disciplines (analysis, topology, geometry, among them). In liquid crystals, the topological defects are easily observable experimentally and play an important role in the formation of the microstructure. There exist numerous experimental and theoretical studies of defects in nematics, but there is still a lack in the rigorous understanding of their appearance and structure. The aim of these lectures is to present recent developments in the analysis of defects in the theory of Landau-de Gennes for nematic liquid crystals, a theory that shows an intense mathematical research in the last ten years.

PROGRAMME

1. Introduction to liquid crystals, mathematical aspects: comparison of several models LC models; intro to Q-tensor theory of Landau-de Gennes; defect patterns in Q-tensor framework. (Lecture 1)
2. Defects in a 2D model of the Landau-de Gennes theory. Relation with vortices in the Ginzburg-Landau theory. (Lectures 2 and 3)
3. Point defect (the hedgehog) in a 3D model of the Landau-de Gennes theory. (Lecture 4)
4. Asymptotic symmetry of defect profiles in 2D LdG model. (Lecture 5)

*Registration is free, but inscription is required before 31st May: So as to inscribe send an e-mail to roldan@bcmath.org. Student grants are available. Please, let us know if you need support for travel and accommodation expenses.