

Axisymmetric Nematic Soap Films

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Abstract

Nematic films are thin fluid structures, ideally two dimensional, endowed with an in-plane nematic order. Some variational models for nematic films have been introduced by Giomi in 2012 and by Napoli and Vergori in 2018. At equilibrium, the shape of the nematic film results from the competition between surface tension, which favors the minimization of the area, and the nematic elasticity, which instead promotes the alignment of the molecules along a common direction. The main difference between the two mentioned approaches is the way to compute the surface derivative of the nematic vector field. In this seminar I will briefly describe the physical models, and I will present a variational analysis of the proposed models for revolution surfaces spanning two coaxial rings. This talk is based on joint works with Giulia Bevilacqua (Venezia), Chiara Lonati (Torino) and Alfredo Marzocchi (Brescia).

References:

1. G. Bevilacqua, C. Lonati, L. Lussardi and A. Marzocchi, *A variational analysis of nematic axisymmetric films: the covariant derivative case*, Calc. Var. Partial Differential Equations 65 (2026), no. 14, 25 pp.
2. G. Bevilacqua, C. Lonati, L. Lussardi and A. Marzocchi, *Existence and uniqueness of minimizers for axisymmetric nematic films*, submitted.