

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 30 August 2017, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

Numerical approximations of nematic-isotropic flows

by Giordano Tierra
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Abstract. In this talk I introduce a PDE system to model mixtures composed by isotropic fluids and nematic liquid crystals, taking into account viscous, mixing, nematic, stretching and anchoring effects and reformulating the corresponding stress tensors in order to derive a dissipative energy law. Then, I present new linear unconditionally energy-stable splitting schemes that allows us to split the computation of the three pairs of unknowns (velocity- pressure, phase field-chemical potential and director vector-equilibrium) in three different steps. The fact of being able to decouple the computations in different linear sub-steps maintaining the discrete energy law is crucial to carry out relevant numerical experiments under a feasible computational cost and assuring the accuracy of the computed results. Finally, I present numerical simulations to show the influence of the shape of the nematic molecules (stretching effects) in the dynamics and to illustrate the importance of the interfacial interactions (anchoring effects) in the equilibrium configurations achieved by the system.