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Electrokinetics of Colloidal Particles in Nematic Liquid Crystals
CHRISTOPHER CONKLIN, JORGE VINALS, Univ of Minn - Minneapolis — Colloidal particles in a liquid crystalline matrix present a large variety of self-assembly behaviors through long range elastic interactions and topological constraints. When subjected to electric fields, electrokinetic effects provide an additional mechanism for colloidal particle interaction and manipulation. We present theoretical and numerical results of induced charge distributions, stresses, and fluid motion when colloidal particles are suspended in a nematic liquid crystal thin film that is subjected to an applied, uniform AC field. In our study, spatial charge separation and the resulting electrokinetic forces are due to anisotropic ionic mobilities and liquid crystal permittivity. We also include the effects of backflows on a time-dependent director orientation, which allows for the study of electrokinetic flows at non-negligible Ericksen number. The interplay between elastic and electrokinetic effects leads to new and complex interactions between colloidal particles.

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