Abstract Submitted
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Modelling the dynamics of colloidal nanorods in a spatially varying electric field GREGORY RICHARDS, Dept. of Mathematical Sciences and Liquid Crystal Institute - KSU, XIAOYU ZHENG, Dept. of Mathematical Science - KSU, PETER PALFFY-MUHORAY, Liquid Crystal Institute - KSU — The behavior of anisotropic nanoparticles is of great current interest in the design of optical metamaterials. We have carried out numerical simulations to model the dynamical behavior of metallic nanorods, dispersed in an isotropic solvent, under the influence of a radially varying electric field. Diffusive and convective transport is considered both in orientation and position space. The Smoluchowski equation governing the spatial and orientational probability density function (PDF) was derived. Discretization was carried out using a finite-volume method on a mesh generated via Voronoi tesselation and regularization on the unit sphere. The time evolution of the PDF was obtained using a combination of operator splitting and a stable biconjugate gradient method. We present the results of our numerical experiments. We report interesting and anomalous behavior, where, due to the coupling of orientation and translational mobility, the applied field depopulates certain orientational states, similar to 'orientational hole burning' in nonlinear optics.

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