

ICM-9010-03 Numerical Minimization of the Landau-deGennes Free Energy: Defects in Cylindrical Capillaries, E.C. Gartland, Jr., P. Palffy-Muhoray and R.S. Varga, *Mol. Cryst. Liq. Cryst.* 199(1991), 429-452.

ABSTRACT: In order to study the structure of defects in nematic liquid crystals, we have constructed a numerical procedure that minimizes the Landau-de Gennes free energy model. Using a new representation, a finite-element discretization, and a direct minimization scheme based on Newton's method and successive overrelaxation, this procedure determines the order parameter tensor field in three dimensions for a general physical problem with Dirichlet boundary conditions. As a sample problem, we have considered a nematic liquid crystal in a cylindrical capillary with boundary conditions that necessarily give rise to at least one defect. We find that for our parameters, two biaxial defects appear near the ends of a capillary with homeotropic alignment, and that near the center, the director is perpendicular to the axis of the cylinder.