Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Effects of dielectric relaxation on the director dynamics of uniaxial nematic liquid crystals[1] MINGXIA GU, YE YIN, SERGIJ V. SHIYANOVSKII, OLEG D. LAVRENTOVICH, Chemical Physics Interdisciplinary Program, Liquid Crystal Institute, Kent State University, Kent, Ohio 44242, USA — We derive the reorienting dielectric torque acting on the director, considering the frequency dependence of the dielectric tensor. The model takes account into the effects of multiple relaxations in both parallel and perpendicular components of the dielectric tensor and predicts the "dielectric memory effect" (DME), i.e., dependence of the dielectric torque on both the "present" and "past" values of the electric field and the director. In a sharply rising electric field, the DME slows down director reorientation for the materials whose dielectric anisotropy is positive at low frequencies, but speeds up the response for the dielectrically negative materials. We also demonstrate, both theoretically and experimentally that an induced "memory" polarization leads to a dielectric torque in the switch-off phase which has an opposite sign to that of the LC's dielectric anisotropy, when a specific switching-off profile is used; this reverse torque accelerates the director relaxation back to the equilibrium state.

[1]Supported by DOE Grant No. DE-FG02-06ER 46331.

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Date submitted: 14 Dec 2007 Electronic form version 1.4