Abstract Submitted
for the CAL11 Meeting of
The American Physical Society

Field Control of the Surface Electroclinic Effect in Liquid Crystal Displays DANA HIPOLITE, MARO TSIIFTE, KARL SAUNDERS, Dept. of Physics, California Polytechnic State University, San Luis Obispo, CA 93407 — Liquid crystals (LCs) are a fascinating class of materials exhibiting a range of phases intermediate between liquid and crystalline. Smectic LCs consist of elongated molecules arranged in a periodic stack (along z) of liquid like layers. In the smectic-A (Sm-A) phase, the average molecular long axis (director) points along z. In the smectic-C (Sm-C) phase, it is tilted relative to z, thus picking out a special direction within the layers. Typically, the Sm-A* to Sm-C* transition will occur as temperature is decreased. In chiral smectics (Sm-*A or Sm-C*) it is possible to induce director titling (i.e. the Sm-C* phase) from the Sm-A* phase via the application of an electric field. This is known as the "bulk electroclinic effect" (BECE). Often, e.g. in a LCD, the Sm-A* phase is in contact with a surface. The surface acts as a localized electric field, and induces a local tilt, i.e. a local Sm-C* phase. This "surface electroclinic effect" (SECE) leads to a distortion of the smectic layers, which reduces LCD quality. We present a model of the Sm-A*-Sm-C* transition, including both BECE and SECE. Analysis of this model shows that the SECE can be controlled, and even eliminated, by a bulk electric field.

Dana Hipolite
Dept. of Physics, California Polytechnic State University,
San Luis Obispo, CA 93407

Date submitted: 04 Oct 2011 Electronic form version 1.4