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Field Control of the Surface Electroclinic Effect in Liquid Crystal Displays I¹ DANA HIPOLITE, KARA ZAPPITELLI, KARL SAUNDERS, California Polytechnic State University, San Luis Obispo — 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.

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