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Defects in smectic C liquid crystals

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If a surface stabilized liquid crystal cell is cooled from the smectic-A to the smectic-C phase its layers thin causing V-shaped (chevron like) defects to form. These sharp bends in turn create an energy barrier that has to be overcome in ferro-electric switching between equilibrium patterns. In the limit as the smectic layer thickness tends to zero, the barrier becomes infinite and ad-hoc terms have been included to overcome it. We examine a gradient flow for a mesoscopic Chen—Lubensky energy $F(\psi; n)$ where the order parameter can vanish. In this model the energy barrier does not diverge as the layer thickness becomes small. The liquid crystal can evolve between equilibrium states in such a way that the layers are allowed to melt and heal, and the cone angle can thin near the chevron tip in the process.

This is joint work with Lidia Mrad.

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