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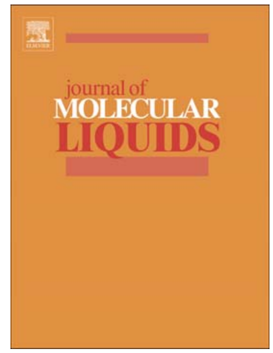

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Novel Universality Classes in Ferroelectric Liquid Crystals

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Abstract

Starting from a Langevin formulation of a thermally perturbed nonlinear elastic model of the ferroelectric smectic-C* (SmC*) liquid crystals in the presence of an electric field, this article characterizes the hitherto unexplored dynamical phase transition from a thermo-electrically forced ferroelectric SmC* phase to a chiral nematic liquid crystalline phase and vice versa. The theoretical analysis is based on a combination of dynamic renormalization (DRG) and numerical simulation of the emergent model. While the DRG architecture predicts a generic transition to the Kardar-Parisi-Zhang (KPZ) universality class at dynamic equilibrium, in agreement with recent experiments, the numerical simulations of the model show simultaneous existence of two phases, one a *subdiffusive* (SD) phase characterized by a dynamical exponent value of 1, and the other a KPZ phase, characterized by a dynamical exponent value of 1.5. The SD phase flows over to the KPZ phase with increased external forcing, offering a new universality paradigm, hitherto unexplored in the context of ferroelectric liquid crystals.

Keywords: Ferroelectric liquid crystals; Kosterlitz-Thouless transition; renormalization group theory; Kardar-Parisi-Zhang equation

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