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Envelope Dynamics of an Experimental Electroconvection Pattern[1] G. ACHARYA, Kent State University, G. DANGELMAYR, I. OPREA, Colorado State University, J.T. GLEESON, Kent State University — A video displaying electroconvection of the nematic I52 is analyzed. Spatial Fourier transforms of the frames reveal that the dynamics is driven by four groups of oblique (relative to the director) modes corresponding to counterpropagating pairs of traveling waves. This is consistent with a stability analysis of the electrohydrodynamic equations, which predict for I52 a Hopf bifurcation with four oblique critical wave numbers. Beyond the linear stability analysis, a weakly nonlinear analysis tells that the evolution of the pattern is governed by four slowly varying (in space and time) envelopes. These four envelopes are extracted from the pattern using Fourier analysis, and analyzed using several diagnostic tools such as statistical analysis, Karhunen Loeve decomposition, and the computation of correlation lengths and times as well as Lyapunov exponents. The results of this analysis indicate that the pattern shows extensive spatiotemporal chaos.

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