Anisotropy of Spatiotemporal Decorrelation in Electrohydrodynamic Turbulence

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Nonlinear straining and random sweeping spatiotemporal decorrelation properties, originally introduced as the main processes for turbulent fluctuations decorrelation in usual fluid flows, have been observed experimentally in anisotropic electroconvective turbulence generated in a nematic liquid crystal under the action of an external oscillating electric field (Fig. 1). A transition between both processes occurs when the instability is driven toward states of increasing complexity, thus showing that decorrelation mechanisms in turbulent media are more universal than naively expected. A model for both decorrelation mechanisms is introduced, its comparison with experimental results providing an estimate of the characteristic sweeping velocity.

Fig. 1: Four snapshots of the intensity field of EHD turbulence for different values of the voltage.

REFERENCES