Self-organization and transition to weak turbulence in electroconvection of nematic liquid crystals

V. Delev, O. Scaldin, Yu. Timirov

Institute of Molecule and Crystal Physics, Russian Academy of Sciences, 151 Prospekt Oktyabrya, Ufa, 450075, Russia, e-mail: delev@anrb.ru

In this work the transition from stationary grid pattern (GP) to weak turbulence in planarly oriented nematic liquid crystal under d.c. electric field has been investigated using the combined measurements of the local optical (1) and integral acoustic responses (2). It was shown earlier that the interaction between two oscillating modes: *longitudinal* – along the initial director orientation and *azimuthal* – along the crystallographic axes of hexagonal GP causes the self-organization of domain oscillations into macroscopic concentric and spiral phase waves (3). Using the experimental data, the largest Lyapunov exponent and correlation dimension as stochasticity criteria of system motion have been determined. From obtained results we have concluded that the temporal evolution of system is attributed to the deterministic chaos with the low dimensional chaotic attractor (fig.1) and the transition to spatio-temporal chaos is accompanied by weak intermittence.

References

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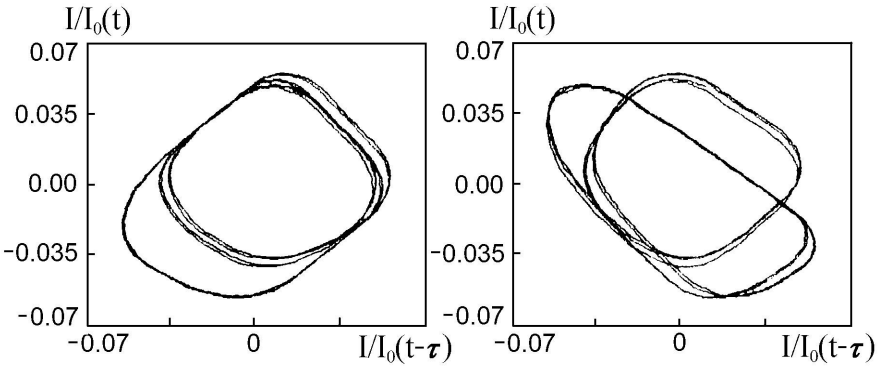

Fig.1. The reconstructed chaotic attractor in pseudo-phase plane {I(t), I(t-τ)} for two different time delays at $1.25U_c$: $\tau=1.5$ s (left) and $\tau=4.5$ s (right).