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Chaos near the onset of electroconvection of a homeotropic nematic liquid crystal[1] SHENG-QI ZHOU, GUENTER AHLERS, Dept. of Physics and iQCD, University of California, Santa Barbara — We report on shadowgraph measurements of spatio-temporal chaos patterns of electro-convection in the homeotropically aligned nematic liquid crystal MBBA. The cell had a thickness of 27 μm and a conductivity of $7.3 \times 10^{-8}\,(\Omega\,\mathrm{m})^{-1}$. An AC voltage of amplitude V and frequency f with $20 \leq f \leq 200$ Hz was applied orthogonal to the cell plane. We found oblique (normal) rolls for $f < f_L$ ($f > f_L$) with $f_L \simeq 75$ Hz. From the structure factor (square of the modulus of the Fourier transform) of the images we determined a correlation length ξ (inverse half-width) and maximum S_0. For small $\epsilon \equiv V^2/V_c^2 - 1 > 0$ fits of power laws to the results for ξ (S_0) yielded an exponent smaller (larger) than that predicted from Ginzburg-Landau equations. The departure from theory is similar to that found previously for domain chaos in rotating Rayleigh-Benard convection[2] and recent electro-convection measurements in a planar nematic liquid crystal.[3]

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[2]Y. Hu, R. E. Ecke and G. Ahlers, Phys. Rev. Lett. **74**, 5040 (1995).
[3]X.-C. Xu and G. Ahlers, unpublished.

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