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Homological Characterization of Spiral Defect Chaos[1] MICHAEL SCHATZ, MARCIO GAMEIRO, KONSTANTIN MISCHAIKOW, Georgia Institute of Technology, KAPIL KRISHAN, University of California, Irvine, SANTIAGO MADRUGA, HERMANN RIECKE, Northwestern University — Relating the global structure of patterns to underlying dynamics is an important aspect of the study of complex systems. We use the mathematics of homology to characterize data from laboratory experiments and numerical simulations of spiral defect chaos, a weakly turbulent state of Rayleigh-Benard convection. We note observations implying asymmetries between hot and cold flows, novel measures of boundary influence and indicators of system control parameters. We also find the evolution of the global structure of the flow to be primarily stochastic unlike the locally chaotic signatures reported previously.

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