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Defect Dynamics in Hexachaos WILL BRUNNER, MPI-DS/Cornell University, JONATHAN MCCOY, Cornell University, WERNER PESCH, University of Bayreuth, EBERHARD BODENSCHATZ, MPI-DS/Cornell University — We present a new state of spatio-temporal chaos in inclined layer convection which we term hexachaos. We create this state when we break the symmetry of hexagons in non-Boussinesq convection by inclining the fluid layer by 5° from horizontal. This causes one of the three modes of the hexagonal pattern (that parallel to the tilt direction) to be preferred, while the two oblique modes are weakened and their amplitudes become chaotic. To better understand the dynamics of this system, we study topological defects it contains. We separate the three modes by Fourier demodulation, and locate dislocations in each mode separately. We then group dislocations pairwise into either penta-hepta defects (PHDs) or new entities which we term same-mode complexes (SMCs.) We then observe the various reactions which these defects participate in, and derive statistics of these reactions. We observe that SMCs are destroyed at rates proportional to their density, as opposed to PHDs which are destroyed proportional to their density squared. We show that this difference is consistent with the mass action law applied to the respective reaction equations, and speculate on the similarity to results found in other hexagonal systems with broken symmetry.

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