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Equilibrium behavior of coarse-grained chaos DAVID A. EGOLF, CHRISTOPHER C. BALLARD, C. CLARK ESTY, Dept of Physics, Georgetown University — A wide variety of systems exhibiting spatiotemporal chaos have been shown to be extensive, in that their fractal dimensions grow linearly with volume. Ruelle argued that this extensivity is evidence that these systems can be viewed as a gas of weakly-interacting regions. We have tested this idea by performing large-scale computational studies of spatiotemporal chaos in the 1D complex Ginzburg-Landau equation, and we have found that aspects of the coarse-grained system are well-described not only as a gas, but as an *equilibrium* gas — in particular, a Tonks gas (and variants) in the grand canonical ensemble. Furthermore, for small system sizes, the average number of particles in the corresponding Tonks gas exhibits oscillatory, decaying deviations from extensivity in agreement with deviations in the fractal dimension found by Fishman and Egolf. This result not only supports Ruelle's picture but also suggests that the coarse-grained behavior of this far-from-equilibrium system might be understood using equilibrium statistical mechanics.

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