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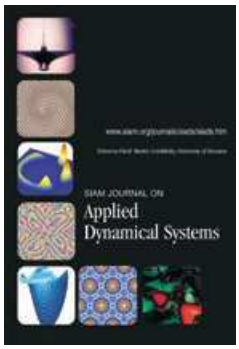

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Title	On state space geometry of the Kuramoto-Sivashinsky flow in a periodic domain
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Abstract	The continuous and discrete symmetries of the Kuramoto-Sivashinsky system restricted to a spatially periodic domain play a prominent role in shaping the invariant sets of its chaotic dynamics. The continuous spatial translation symmetry leads to relative equilibrium (traveling wave) and relative periodic orbit (modulated traveling wave) solutions. The discrete symmetries lead to existence of equilibrium and periodic orbit solutions, induce decomposition of state space into invariant subspaces, and enforce certain structurally stable heteroclinic connections between equilibria. We show, on the example of a particular small-cell Kuramoto-Sivashinsky system, how the geometry of its dynamical state space is organized by a rigid `cage' built by heteroclinic connections between equilibria, and demonstrate the preponderance of unstable relative periodic orbits and their likely role as the skeleton underpinning spatiotemporal turbulence in systems with continuous symmetries. We also offer novel visualizations of the high-dimensional Kuramoto-Sivashinsky state space flow through projections onto low-dimensional, PDE representation independent, dynamically invariant intrinsic coordinate frames, as well as in terms of the physical, symmetry invariant energy transfer rates.
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