

Abstract Submitted
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Diverse phenomena in conservative surface dynamics with broken parity¹ MARTIN GELFAND, R. MARK BRADLEY, Dept of Physics, Colorado State Univ — Local, conservative surface dynamics with linear instabilities in systems ranging from ion-bombarded surfaces to step flow in homoepitaxy to wind-blown sand have all been described by the conserved Kuramoto-Sivashinsky (cKS) equation. The cKS equation is well understood and exhibits coarsening. When parity symmetry is absent, it would seem that a nonlinear term of the form $\partial_x(\partial_x u)^2$ ought to be included, but its effects do not appear to have been studied previously. In the absence of the cKS nonlinearity the parity-breaking nonlinearity would lead to finite-time singularities; but when both nonlinear terms are present the solutions are well behaved. At least two qualitatively distinct behaviors are possible, depending on parameters: coarsening, as in the cKS equation, and non-coarsening “traveling wave” solutions with prominent features that are mostly frozen-in at short times and an envelope that evolves much more slowly than the wave speed.

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