

Colloquium

Coherent structures in non-local dispersive active-dissipative systems

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摘 要：

We analyze coherent structures in non-local dispersive active-dissipative nonlinear systems, using as a prototype the Kuramoto-Sivashinsky (KS) equation with an additional non-local term that contains stabilizing/destabilizing and dispersive parts. We show that sufficiently strong dispersion regularizes the chaotic dynamics of the KS equation and the solutions evolve into arrays of interacting pulses that can form bound states. We analyze the asymptotic characteristics of such pulses and show that their tails tend to zero algebraically but not exponentially as for the local gKS equation. We develop a weak-interaction theory and show that the standard first-neighbor approximation is not applicable anymore. It is then essential to take into account long-range interactions due to the algebraic decay of the tails of the pulses. In addition, we find that the number of possible bound-states for fixed parameter values is always finite, and we determine when there is long-range attractive or repulsive force between the pulses.