Localized States in Periodically Forced Systems

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Abstract

The theory of stationary spatially localized patterns in dissipative systems driven by time-independent forcing is well developed. With time-periodic forcing, related but time-dependent structures may result. These may consist of breathing localized patterns, or states that grow for part of the cycle via nucleation of new wavelengths of the pattern followed by wavelength annihilation during the remainder of the cycle. These two competing processes lead to a complex phase diagram whose structure is a consequence of a series of resonances between the nucleation time and the forcing period [1]. The resulting diagram is computed for the periodically forced quadratic-cubic Swift–Hohenberg equation, and its details are interpreted in terms of the properties of the depinning transition for the fronts bounding the localized state on either side. Both sinusoidal and nonsinusoidal forcing is considered. The results are expected to shed light on localized states in a large variety of periodically driven systems.

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