

Waves in a Box: Old and New States in Binary Fluid Convection

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Binary fluid mixtures, heated from below, exhibit a bewildering variety of behavior. Of particular interest are different types of nonlinear waves that can be observed near onset of motion, i.e. of convection. These include states that have been called chevrons, others called blinking states and a remarkable state called a repeated transient. Numerical simulations shed much light on the origin of these states and the relation among them. They also allow us to identify the changes that take place with increasing forcing, and hence the transition from a system exhibiting a small number of degrees of freedom to one in which many degrees of freedom play a role. I will conclude by describing the properties of a convecton, a novel spatially localized state of steady convection, discovered through these simulations.