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Spiral Defect Chaos in Generalized Swift-Hohenberg Models with Mean Flow[1] ALIREZA KARIMI, Virginia Tech, ZHI-FENG HUANG, Wayne State University, MARK PAUL, Virginia Tech — We present a numerical study of spiral defect chaos in two generalized models of the Swift-Hohenberg equation with mean flow. We use large-sized square domains with periodic boundaries and integrate the equations for very long times (up to one million time units) to study the effect of mean flow on pattern dynamics as the strength of mean flow is varied. The magnitude of mean flow is adjusted via a continuous parameter characterizing the type of the velocity boundary conditions on the horizontal surfaces in a convective flow. We show that the typical parameters used in the literature for spiral defect chaos studies yield a weak mean flow magnitude and leads to a state dominated by large and slowly moving target defects. When the magnitude of mean flow is sufficiently large, it is demonstrated that spatiotemporal chaos is feasible as indicated by a positive Lyapunov exponent. In addition, we compare the spatial distribution of the mean flow for these models with that of large aspect ratio Rayleigh-Bénard convection undergoing spiral defect chaos and discuss their differences near spiral defects.

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