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A numerical study of coarsening in the two-dimensional complex Ginzburg-Landau equation[1] WEIGANG LIU, UWE TAUBER, Department of Physics and Center for Soft Matter and BIological Physics, Virginia Tech — The complex Ginzburg-Landau equation with additive noise is a stochastic partial differential equation that describes a remarkably wide range of physical systems: coupled non-linear oscillators subject to external noise near a Hopf bifurcation instability; spontaneous structure formation in non-equilibrium systems, e.g., in cyclically competing populations; and driven-dissipative Bose-Einstein condensation, realized in open systems on the interface of quantum optics and many-body physics. We employ a finite-difference method to numerically solve the noisy complex Ginzburg-Landau equation on a two-dimensional domain with the goal to investigate the coarsening dynamics following a quench from a strongly fluctuating defect turbulence phase to a long-range ordered phase. We start from a simplified amplitude equation, solve it numerically, and then study the spatio-temporal behavior characterized by the spontaneous creation and annihilation of topological defects (spiral waves). We check our simulation results against the known dynamical phase diagram in this non-equilibrium system, tentatively analyze the coarsening kinetics following sudden quenches between different phases, and have begun to characterize the ensuing aging scaling behavior.

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