Abstract

The aim of this study is to quantify and characterize the dynamic heterogeneity (transient and incoherent patterns) in spatially-extended systems. Coupled map lattices of the logistic, exponential and the host parasite map are used as model systems and the variation of transient and incoherent phenomena with respect to different nonlinear map functions and the model parameters is studied. A few quantities based on statistical measures and image analysis of the transient states in the CML is developed to characterize their occurrence for each map. We have formulated a new quantitative measure to characterize the long term spatiotemporal incoherent states, that can differentiate between the Chimeric states and the other types of heterogeneity. We show that the transient and long term spatiotemporal dynamics in a coupled system depends on the intrinsic nonlinear function, coupling strength, the number of neighbors, and initial conditions. We also observed that the spatial extent of the transient states follow a power law and incoherent states like Chimera patterns are much more frequent in the lattice of exponential maps than that of the logistic maps.