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Rapid Communication

Coevolution of dynamical states and interactions in dynamic networks

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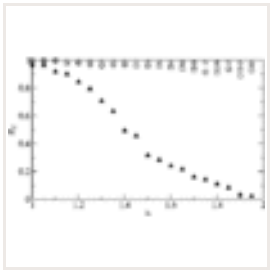
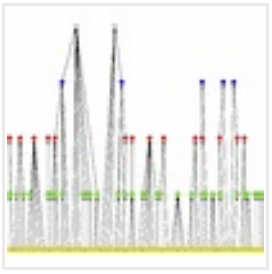
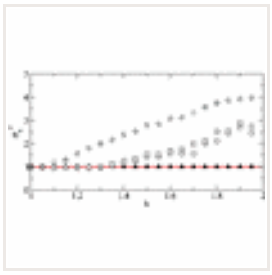
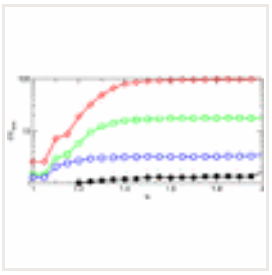
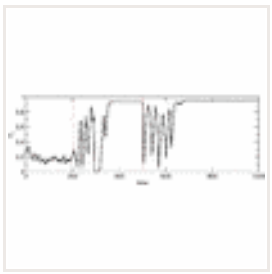
ABSTRACT

We explore the coupled dynamics of the internal states of a set of interacting elements and the network of interactions among them. Interactions are modeled by a spatial game and the network of interaction links evolves adapting to the outcome of the game. As an example, we consider a model of cooperation in which the adaptation is shown to facilitate the formation of a hierarchical interaction network that sustains a highly cooperative stationary state. The resulting network has the characteristics of a small-world network when a mechanism of local neighbor selection is introduced in the adaptive network dynamics. The highly connected nodes in the hierarchical structure of the

network play a leading role in the stability of the network. Perturbations acting on the state of these special nodes trigger global avalanches leading to complete network reorganization.

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