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Localized coherence in two interacting populations of social agents

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Abstract

We investigate the emergence of localized coherent behavior in systems consisting of two populations of social agents possessing a condition for non-interacting states, mutually coupled through global interaction fields. We employ two examples of such dynamics: (i) Axelrod's model for social influence, and (ii) a discrete version of a bounded confidence model for opinion formation. In each case, the global interaction fields correspond to the statistical mode of the states of the agents in each population. In both systems we find localized coherent states for some values of parameters, consisting of one population in a homogeneous state and the other in a disordered state. This situation can be considered as a social analogue to a chimera state arising in two interacting populations of oscillators. In addition, other asymptotic collective behaviors appear in both systems depending on parameter values: a common homogeneous state, where both populations reach the same state; different homogeneous states, where both population reach homogeneous states different from each other; and a disordered state, where both populations reach inhomogeneous states.

Key words: Social dynamics; Mass media; Networks; Chimera states.

The study of the collective behaviors in systems consisting of two interacting populations of dynamical elements is a topic of much interest in various sciences. These systems are characterized by the presence of nonlocal interactions between elements in different populations. Examples of such systems arise in the coexistence of biological species [1–3], the competition of two languages in space [4], and in the dynamics of two networks of coupled oscillators [5–7].