

Phase synchronization and topological defects in inhomogeneous spatially extended systems

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The influence of topological defects on phase synchronization and phase coherence in two-dimensional arrays of locally coupled, nonidentical chaotic oscillators is investigated. We show that topological defects generally lead to a breakdown of phase synchronization in the vicinity of the topological defect due to their motion. Yet, the system is much more phase coherent as long as the coupling between the oscillators is strong enough to prohibit the dynamic generation of topological defects. The generic occurrence of topological defects in two and higher dimensions implies that the concept of phase synchronization has to be modified for these systems.

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