
Emergence of phase-locked states for the Winfree model in a large coupling regime

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Abstract

We study the large-time behavior of the globally coupled Winfree model in a large coupling regime. The Winfree model is the first mathematical model for the synchronization phenomenon in an ensemble of weakly coupled limit-cycle oscillators. For the dynamic formation of phase-locked states, we provide a sufficient framework in terms of geometric conditions on the coupling functions and coupling strength. We show that in the proposed framework, the emergent phase-locked state is the unique equilibrium state and it is asymptotically stable in an ℓ^1 -norm; further, we investigate its configurational structure.

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