Synchronization of Discrete Oscillators

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A lattice of three-state stochastic phase-coupled oscillators introduced by Wood et al. [Phys. Rev. Lett. 96, 145701 (2006)] exhibits a phase transition at a critical value of the coupling parameter a, leading to stable global oscillations (GO). On a complete graph, upon further increase in a, the model exhibits an infinite-period (IP) phase transition, at which collective oscillations cease and discrete rotational symmetry is broken [Assis et al., J. Stat. Mech. (2011) P09023]. These authors showed that the IP phase does not exist on finite-dimensional lattices. Here, we verify the IP phase on networks with long-range coupling but of lower connectivity than a complete graph, i.e., ring lattices and small-world networks. Such systems also exhibit travelling-wave states.