

Abstract Submitted
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Power Spectrum of the Finite Kuramoto Model DAVID MERTENS, RICHARD WEAVER, University of Illinois at Urbana-Champaign — We study the synchronization of oscillators in the finite Kuramoto model, a simple model for coupled phase oscillators that exhibits a phase transition. The usual self-consistent approach used in studying the Kuramoto model gives a prediction for the distribution of modified frequencies that includes a Dirac delta at the synchronized frequency and a depletion of nearby frequencies. For finite systems, the prediction adequately describes the distribution of frequencies averaged over very long durations, but the accompanying power spectrum of the order parameter looks very different. The sharp peak at the synchronization frequency has a finite width and oscillators that are otherwise entrained manage to occasionally escape. The resulting harmonics of these escaped oscillators leads to a power spectrum with an exponential drop-off from the peak, rather than the originally predicted depletion.

David Mertens
University of Illinois at Urbana-Champaign

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