

Abstract Submitted
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A Subpopulation Approach to the Finite Kuramoto Model DAVID MERTENS, Dickinson College — The Kuramoto model is the canonical model for studying spontaneous collective synchronization, notable because the functional form of the order parameter in its second order transition can be calculated analytically. Since its introduction nearly four decades ago, nearly all of the work on the underlying model has focused on the behavior of the order parameter for very large populations. Surprisingly little interest has been paid to small, discrete populations. In this talk I will introduce a new approach to analyzing the finite Kuramoto model based on a remarkably simple resumption of the interaction terms. This representation of the Kuramoto model is mathematically identical to the original Kuramoto model. However, rather than frame the model as an all-to-all interaction between oscillators or an interaction between oscillators and a mean field, this representation suggests a model of interacting subpopulations. This approach provides a much more intuitive starting point for making meaningful approximations and calculating important transitions for specific finite populations, as I will demonstrate.

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