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A linear reformulation of the Kuramoto model of self-synchronizing coupled oscillators DAVID ROBERTS, Los Alamos National Laboratory — This talk will present a linear reformulation of the Kuramoto model describing a self-synchronizing phase transition in a system of globally coupled oscillators that in general have different intrinsic frequencies. The reformulated model provides an alternative coherent framework through which one can analytically tackle synchronization problems that are not amenable to the original Kuramoto analysis. It allows one to 1) find an analytic solution for a new class of continuum systems and 2) solve explicitly for the synchronization order parameter and the critical point of the phase-locking transition for a system with a finite number of oscillators (unlike the original Kuramoto model, which is solvable implicitly only in the mean-field limit). It also makes it possible to probe the system's dynamics as it moves towards a steady state. While this talk will cover only systems with global coupling, the new formalism introduced by the linear reformulation also lends itself to solving systems that exhibit local or asymmetric coupling.

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