
A spectral theory of linear operators on a Gelfand triplet and its application to the dynamics of coupled oscillators

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Abstract

The Kuramoto model is a system of ordinary differential equations for describing synchronization phenomena defined as a coupled phase oscillators. In this talk, an infinite dimensional Kuramoto model is considered, and Kuramoto's conjecture on a bifurcation diagram of the system will be proved. A linear operator obtained from the infinite dimensional Kuramoto model has the continuous spectrum on the imaginary axis, so that the usual spectrum does not determine the dynamics. To handle such continuous spectra, a new spectral theory of linear operators based on Gelfand triplets is developed. In particular, a generalized eigenvalue (resonance) is defined. It is proved that a generalized eigenvalue determines the stability and bifurcation of the system.

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