

Laplacian Networks and Their Synchronies

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In 1975, Kuramoto introduced a model of coupled identical oscillators to study synchrony phenomena. Building upon the network graph formalism developed in 2003 by Golubitsky, Stewart, and collaborators, we generalize this model by assuming that the linearization of the governing vector field at any point is a Laplacian matrix. In this talk, we explore the deep connection between the spectrum of the Laplacian matrix and the topology of the underlying network. In particular, we show how topological features of the graph can be used to understand the stability of critical synchrony configurations. We demonstrate that total synchrony equilibria are generically stable under these conditions. Joint work with T. Amorim (UFPE, Brazil).

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