

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Synchronization of phase oscillators in large complex networks

JUAN RESTREPO, EDWARD OTT, IREAP, University of Maryland, BRIAN HUNT, IPST, University of Maryland — It has been shown in recent years that many real world networks have a complex structure (e.g., scale-free networks). The effect of a complex interaction network on the dynamics of coupled dynamical systems is, therefore, of interest. An important aspect of the dynamics is the synchronization of coupled oscillators. I will present a generalization of the classical Kuramoto model of all-to-all coupled oscillators to the case of a general topology of the network of interactions. We find that for a large class of networks, there is still a transition from incoherence to coherent behavior at a critical coupling strength that depends on the largest eigenvalue of the adjacency matrix of the network. I will discuss the application of our theory to study the effect of heterogeneity in the degree distribution and degree-degree correlations in the network. Finally, I will comment on generalizations to more realistic dynamical systems.

Juan Restrepo
IREAP, University of Maryland

Date submitted: 04 Dec 2005

Electronic form version 1.4