Washington University in St. Louis

SCHOOL OF ENGINEERING & APPLIED SCIENCE

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

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Tuesday, November 14, 2017
Green Hall, Room 0120
11:10 A.M.

Title: Phase Reduction and Synchronization of a Network of Coupled Dynamical Elements Exhibiting Collective Oscillations

Abstract: Networks of coupled dynamical elements exhibiting collective oscillations often play important functional roles in real-world systems. We propose a method of dimensionality reduction for such networks by extending the classical phase reduction method for nonlinear limit-cycle oscillators. By projecting the network state to a single phase variable, a simple one-dimensional phase equation describing the collective oscillation of the network is derived. The derived phase equation is general and can be used in analyzing and controlling collectively oscillating networks subjected to weak driving signals. As a simple example, synchronization between collectively oscillating random networks of heterogeneous neural oscillators is analyzed.

Bio: : Hiroya Nakao is currently an associate professor at the department of systems and control, Tokyo Institute of Technology, Japan. He received PhD in Physics from Kyoto University, Japan in 1999. He has been studying in the field of nonlinear dynamics and stochastic processes, in particular, synchronization of nonlinear oscillators and pattern formation in reaction-diffusion systems.

Host: Dr. Jr-Shin Li