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Modeling Excitable Systems Coupled Through External Medium

JAVAD NOORBAKHSH, PANKAJ MEHTA, Boston University — Excitable systems are stable dynamical systems in which any input beyond a threshold results in a significant output. This behavior is ubiquitous in nature and is seen in biological systems such as Dictyostelium discoideum amoeba and neurons to oscillatory chemical reactions. In this work we will focus on transition to oscillation in populations of excitable systems coupled through an external medium and will study their synchronization. We will describe a mechanism to tune the frequency of oscillations using an external input and will study the effects of stochasticity and inhomogeneity on the collective behavior of the system. Furthermore we will include diffusion into the dynamics of the external medium and will study formation of spatial patterns, their characteristics and their robustness to different factors.

Javad Noorbakhsh
Boston University

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