

数学与系统科学研究院
计算数学所定期学术报告

报告人: **Dr. Jiwei Zhang**

(*Beijing Computational Science Research Center*)

报告题目:

**A reduction of spiking neuronal
network dynamics from homogeneity
to synchrony**

邀请人: 谢和虎 研究员

报告时间: 2016 年 5 月 12 日 (周四)

下午 16:00-17:00

报告地点: 科技综合楼三层
311 报告厅

Abstract:

Networks of neurons in the brain are collectively capable of exhibiting a variety of interesting dynamical phenomena. The network's dynamics can be quite complicated, involving correlations across the neurons in the network and across time. The correlation may not be obviously related to the architecture of the network itself. One of the challenges in neuroscience is to develop a language which can be used to parsimoniously describe these complicated dynamics, that is to say, a way of systematically coarse-graining the network.

In this talk I will briefly review some of standard methods for coarse-graining and highlight the regimes for which they fail, then I will also introduce some recent approaches that we have tried, as well as possible direction for future works.

Our reduction succeeds where most current firing-rate and population-dynamics models fail because we capture the emergence of 'multiple-firing-events' involving the semi-synchronous firing of many neurons. Furthermore, our reduction is based on first principles, and provides an analyzable link between the integrate-and-fire network parameters and the 'dynamic-skeleton'.

报告人简介:

张继伟博士 2009 年在香港浸会大学获得博士学位, 于 2014 年到北京计算科学研究中心工作, 之前先后到南洋理工大学和纽约大学克朗所做博后。

张博士主要主要从事无界区域偏微分方程数值解法以及神经科学的建模与计算方面的研究工作。主要成果发表在 SIAM J. Sci. Comput., SIAM J. Num. Anal., J. Comput. Neurosci. 等国际知名期刊上。

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