POLITECNICO DI TORINO

DISMA Dipartimento di Scienze Matematiche G. L. Lagrange

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Online seminar

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Hosted on: Meet

Tung NGUYEN

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Deficiency zero for random reaction networks under Erdos-Renyi and stochastic block model frameworks

Dr Cappelletti introduces the seminar.

Abstract

Reaction networks are commonly used to model a variety of physical systems from the microscopic world like cell biology and chemistry, to the macroscopic world like epidemiology and evolution biology. At its core, a reaction network model consists of two components: the network (or graph) component, and the dynamics under such a graph. Not surprisingly, there is a strong connection between the network structure and the qualitative behavior of the dynamical system. Certain network structures such as deficiency zero ensure many desirable behaviors of the dynamical systems including existence and stability of equilibrium.

In this talk, Mr Nguyen will attempt to address a natural question: how prevalent these structures (in particular deficiency zero) are among random reaction networks. To answer this question, it is important to have a framework to generate random reaction networks. He will present two such frameworks: an Erdos-Renyi framework, and a stochastic block model framework-which is essentially a more generalized version of Erdos-Renyi. Next, he will discuss deficiency zero structure and its importance in the theory of reaction networks, and examine its prevalence under the two random networks frameworks above.

Biography

Tung Nguyen is a 6th year graduate student in the Mathematics department of University of Wisconsin-Madison. He obtained his BA degree (with a double major in Mathematics and Economics) in Illinois Wesleyan University, under the supervision of Prof. Tian-Xiao He.

Currently he is working towards his PhD in Mathematics; his thesis advisor is Prof. David Anderson. His research interest lies at the intersection of probability, stochastic analysis, and mathematical biology. In particular, his research focuses on the theory of chemical reaction networks under both dynamical and graphical aspects.