POLITECNICO DI TORINO

DISMA Dipartimento di Scienze Matematiche G. L. Lagrange

ECCELLENZA 2018 • 2022

Online seminar

Monday October 12, 2020 at 16:30
Hosted on: Meet

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Resilience in Large Random Complex Systems

Prof. Rondoni introduces the seminar.

Abstract

In this talk we will extend the highly influential May's model [1] for randomly assembled ecological systems, beyond the linear approximation around a given point of equilibrium. We will introduce a generic nonlinear model, in which all higher-order terms in the expansion around the chosen point of equilibrium (placed at the origin) are included with random Gaussian coefficients. As the size of the system grows, in correspondence of the known sharp instability-to-stability transition, the evaluation of the mean number of equilibrium points surrounding the origin reveals the emergence of a "resilience gap". Namely, there exists a radius r* such that the system is expected to be resilient to a typical initial displacement r«r*. Beyond this radius the phase space is studded by an exponential number of equilibrium points which force the system to wander away from the origin with high probability.

This talk is based on a joint work with Yan Fyodorov(KCL) and Jesper Ipsen(UniMelb):
https://arxiv.org/pdf/2008.04622.pdf

[1] R. M. May. "Will a large complex system be stable?" Nature 238 413–414 (1972).

Biography

Sirio Belga Fedeli is a PhD student in Applied Mathematics at King's College London, with deep interests in Random Matrix, Applied Mathematics and Statistical Physics. In 2016 he received a master degree in Mathematical Engineering at Politecnico di Torino, while in 2017 he received a master degree in Science of Non-Equilibrium Physics from King's College London.