PHYSICAL MATHEMATICS SEMINAR

Extreme Events in Complex Systems: A Variational Approach

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ABSTRACT:

Many natural phenomena exhibit intermittent extreme behavior manifest as the sporadic bursts in the time series of their observables. Since such extreme events (e.g., ocean rogue waves and El Nino oscillations) can have devastating consequences, their quantification and prediction is of great interest. I propose a variational framework for probing the conditions that trigger intermittent extreme events in high-dimensional nonlinear systems. The triggers are obtained as the solutions of an appropriately constrained optimization problem, where the function to be maximized is a system observable exhibiting bursting episodes. The constraints include the evolution equations of the system and are imposed to ensure the physical relevance of the optimal solutions. I demonstrate the application of the method on a forced incompressible Navier-Stokes equation. In this problem, the optimal solutions reveal the root cause of the intermittent bursts of the energy dissipation.

TUESDAY, FEBRUARY 14, 2017
2:30 PM
Building 2, Room 147

Reception following in Building 2, Room 290
(Math Dept. Common Room)

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