Applied Mathematics Seminar

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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Stability under Uncertainty: Towards a Bifurcation Theory for Dynamical Systems with Bounded Noise

A topical challenge in complex systems research is to understand and quantify the role of randomness for the stability of patterns and behaviours in a given system. In the deterministic (non-noisy) setting, the classical bifurcation theory of dynamical systems studies how a (slow) change in system parameters affects the stability of system behaviours. However, a corresponding bifurcation theory for random dynamical systems is only in its very early stages of development. An important observation here is that assumptions on the type of noise make a difference for the theory. In particular, one may distinguish between bounded and unbounded (for instance Gaussian) noises. In the first part of this talk I consider the notions of (i) stability/robustness and (ii) noise/uncertainty, and discuss some of the challenges in constructing a satisfactory bifurcation theory in the noisy setting. In the second part of the talk I describe some recent efforts towards building a bifurcation theory in the context of bounded noise, which offers a promising alternative to the unbounded approaches.

Wednesday, 20.10.2021 · 16:00 · WGB G08

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