Adaptive time-stepping for Stochastic Partial Differential Equations with non-Lipschitz drift

Stuart Campbell (Heriot-Watt University), Conall Kelly, Gabriel Lord

Traditional explicit numerical methods to simulate stochastic differential equations (SDEs) or stochastic partial differential equations (SPDEs) rely on globally Lipschitz drift and diffusion coefficients to ensure convergence. Many applications of interest include non Lipschitz drift functions. Implicit methods (when they exist) can often be too computationally expensive for practical uses. Therefore construction of explicit methods to simulate SDEs or SPDEs with non-Lipschitz drift is of interest.
Tamed methods are a class of numerical methods that perturb the drift coefficient to ensure strong convergence in the presence of non-Lipschitz drift. In this talk we present an explicit method for simulation of SPDEs which guarantees strong convergence via adaptive time-step size selection instead of drift taming. We will outline the theory behind the method and illustrate the efficiency through some numerical simulations.