Title

Quantitative mixing for locally monotone stochastic evolution equations

Abstract

We establish general quantitative conditions for stochastic evolution equations with locally monotone drift and degenerate additive Wiener noise in variational formulation resulting in the existence of a unique invariant probability measure for the associated ergodic Markovian Feller semigroup. We prove improved moment estimates for the solutions and the e-property of the semigroup.
Furthermore, we provide quantitative upper bounds for the Wasserstein ε-mixing times.
Examples on possibly unbounded domains include the stochastic incompressible 2D Navier-Stokes equations, shear thickening stochastic power-law fluid equations, the stochastic p-Laplace equation, the stochastic heat equation, as well as, stochastic semilinear equations such as the 1D stochastic Burgers equation.

The main novelties are the quantitative nature of the mixing rate and the assumptions, as well as the existence of invariant probability measures without the need for compact energy embeddings or conditions on the dimension of the range of the covariance operator.

Joint works with Gerardo Barrera (IST Lisboa), https://arxiv.org/abs/2412.01381 and https://arxiv.org/abs/2602.00853