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Data-Driven Computation for Periodic Stochastic Differential Equations

Many stochastic differential equations in various applications, like coupled neuronal oscillators, are driven by time-periodic forces. In this talk, I will introduce several data-driven computational tools extended from the autonomous Fokker-Planck equation to the time-periodic setting. This enables the efficient computation of the time-periodic invariant probability measure using either a grid-based method or an artificial neural network solver, and the estimation of the speed of convergence towards the time-periodic invariant probability measure. I will also show the convergence analysis and performance of the algorithms using several numerical examples.