FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

On the ergodicity and sharp error estimate of Stochastic Gradient Langevin Dynamics

Speaker: Yuliang Wang (SJTU)

Time: 2022-12-01, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: Lei Li (SJTU)

Abstract: We establish a sharp uniform-in-time error estimate for the Stochastic Gradient Langevin Dynamics (SGLD), which is a popular sampling algorithm. Under mild assumptions, we obtain a uniform-in-time $O(\eta^2)$ bound for the KL-divergence between the SGLD iteration and the Langevin diffusion, where η is the step size (or learning rate). Our analysis is also valid for varying step sizes. Based on this, we are able to obtain an $O(\eta)$ bound for the distance between the SGLD iteration and the target distribution, in terms of Wasserstein or total variation distances. Moreover, via the technique of reflection coupling, we prove the geometric ergodicity of the SGLD algorithm under W_1 distance without global convexity.