

Stein's method for steady-state diffusion approximations

Speaker: Jim Dai
Cornell University
March 31, 2015

Abstract. We consider $M/Ph/n+M$ queueing systems. We prove the rate of convergence for approximating the stationary distribution of the normalized system size process by that of a piecewise Ornstein-Uhlenbeck (OU) process. We prove that for a large class of functions, the difference of the expectation under the stationary measure of the piecewise OU process and the expectation under the stationary measure of the system size is at most $C/\lambda^{1/4}$, where the constant C is independent of the arrival rate λ and the number of servers n as long as they are in the Halfin-Whitt parameter regime. For the proof, we develop a modular framework that is based on Stein's method. The framework has three components: gradient estimate for Poisson equation solution, generator coupling, and state space collapse.

This is a joint work with Anton Braverman at Cornell.