STABILITY AND PERFORMANCE OF QUEUEING NETWORKS WITH INFINITE SUPPLY OF WORK

July 6th
Room D41
17:30
(p. 38)

Gideon Weiss, Yongjiang Guo, Erjen Lefeber, Yoni Nazarathy, Hanqin Zhang

We generalize the standard multi-class queueing network model by allowing both standard queues and infinite virtual queues which have infinite supply of work. We pose the general problem of finding networks and policies which allow some of the nodes of the network to work with full utilization, and keep all the standard queues stable. Towards this end we show that re-entrant lines, systems of two servers with two re-entrant lines and rings of servers can be stabilized with priority policies under certain parameter restrictions. We further establish simple diffusion limits for the departure and work allocation processes. A third contribution of the paper is with respect to properties of the Markov processes associated with the models. Towards this end, we prove some technical results regarding pettiteness and smallness of compact sets in specific cases. The analysis throughout the paper, depends on model and policy and illustrates the difficulty in solving the general problem.

LARGE DEVIATIONS AND FAST SIMULATION FOR MULTISCALE DIFFUSIONS AND ROUGH ENERGY LANDSCAPES

July 6th
Room E33
16:30
(p. 38)

Konstantinos Spiliopoulos

We discuss the large deviations principle and the problem of designing asymptotically optimal importance sampling schemes for stochastic differential equations with small noise and fast oscillating coefficients. There are three possible regimes depending on how fast the intensity of the noise goes to zero relative to the homogenization parameter. We use weak convergence methods which provide us with convenient representations for the action functional for all three regimes, and then we use these representations to study their similarities and differences. Furthermore, we derive a control that nearly achieves the large deviations lower bound at the prelimit level. This control is useful for designing efficient importance sampling schemes. Standard Monte Carlo methods perform poorly in these kind of problems in the small noise limit, and apart from the smallness of the noise, an additional reason for this is the presence of the fast oscillating coefficients. These results have applications in chemical physics and biology. Examples will be provided.

SAMPLE PATH LARGE DEVIATION FOR INFINITE SERVER QUEUES

July 6th
Room E33
17:00
(p. 38)

Xinyun Chen, Jose Blanchet, Henry K. Lam

In this talk we develop a full Large Deviations Principle (LDP) for the two-parameter state descriptor of the infinite server queue. This result is the large deviations analogue obtained by Pang and Whitt (2010) and Reed and Talreja (2009), for the associated functional Central Limit Theorems. Our analysis holds under the assumption that the