

运筹学与信息科学研究所

Department of Operations Research and Information Science

学术报告

题目： Asymptotic Variability Analysis in Tandem Queues

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时间： 11月11日（星期一） 14:40 - 15:20

地点： 数学院思源楼 615

摘要： We study a multi-stage tandem queueing system and develop the law of the iterated logarithm (LIL) for performance measures including the queue length, workload, busy time, idle time and departure processes. These LIL results can help quantify the level of stochastic variability of these performance functions. Using a strong approximation method, which transforms the renewal-process-based performance functions to their continuous Brownian motion approximations, we establish all the LIL limits and express them as simple functions of model parameters (e.g, means and variances) of the interarrival and service times. Our LIL results reveal clear-cut insights on how the stochastic variability received from upstream stages can be propagated to the downstream echelons in the tandem queue model; we show that stages that are underloaded, overloaded and critically loaded play distinct roles. An underloaded stage simply transfers all received upstream variability to the downstream stages; its own service-time variability makes no impact on any succeeding echelons. An {overloaded} stage overrides the variability received from upstream stages; it resets the propagation process by feeding its successive stages with its own service-time variability alone. A critically loaded inherits the variability received from upstream stages, which it modifies using its own service-time variability.

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