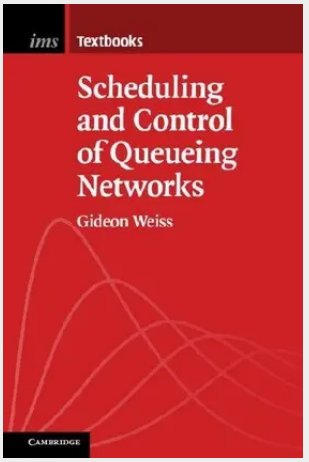
Weiss

Scheduling and Control of Queueing Networks



Applications of queueing network models have multiplied in the last generation, including scheduling of large manufacturing systems, control of patient flow in health systems, load balancing in cloud computing, and matching in ride sharing. These problems are too large and complex for exact solution, but their scale allows approximation. This book is the first comprehensive treatment of fluid scaling, diffusion scaling, and many-server scaling in a single text presented at a level suitable for graduate students. Fluid scaling is used to verify stability, in particular treating max weight policies, and to study optimal control of transient queueing networks. Diffusion scaling is used to control systems in balanced heavy traffic, by solving for optimal scheduling, admission control, and routing in Brownian networks. Many-server scaling is studied in the quality and efficiency driven Halfin–Whitt regime and applied to load balancing in the supermarket model and to bipartite matching in ride-sharing applications.

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