<<随机模型构造性计算理论及其应用>>

图书基本信息

书名：<<随机模型构造性计算理论及其应用>>

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前言

Stochastic systems are involved in many practical areas, such as appliedprobability, queueing theory, reliability, risk management, insurance and finance,computer networks, manufacturing systems, transportation systems, supply chainmanagement, service operations management, genomic engineering and biologicalsciences. When analyzing a stochastic system, block-structured stochastic modelsare found to be a useful and effective mathematical tool. In the study of the block-structured stochastic models, this book provides a unified, constructive andalgorithmic framework on two important directions: performance analysis andsystem decision. Different from those books given in the literature, the frameworkof this book is systematically organized by means of the UL- and LU-types ofRG-factorizations, which are completely developed in this book and have beenextensively discussed by the author. The RG-factorizations can be applied to provideeffective solutions for the block-structured Markov chains, and are shown to bealso useful for optimal design and dynamical decision making of many practicalsystems, such as computer networks, transportation systems and manufacturingsystems. Besides, this book uses the RG-factorizations to deal with some recentinteresting topics, for example, tailed analysis, continuous-state Markov chains,quasi-stationary distributions, Markov reward processes, Markov decision processes,sensitivity analysis, evolutionary game and stochastic game. Note that all thesedifferent problems can be dealt with by a unified computational method throughthe RG-factorizations. Specifically, this book pays attention to optimization, control,decision making and game of the block-structured stochastic models, althoughavailable results on these directions are still few up to now.

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内容概要

本书介绍了随机模型中计算技术的主要基础理论，总结了近十年来国内外所取得的新成果与进展。它构造性地建立了一般马尔可夫过程的RG-分解，其中RG-分解是马尔可夫过程与高斯消元法的完美结合，为求解无限维（或大型）线性方程组提供了有效途径。
全书共分为三个部分。
第一部分描述了如何把排队系统、可靠性工程、制造系统、计算机网络、交通系统、服务系统等应用随机模型转化为块型结构的马尔可夫过程，这为研究许多实际系统的性能评价、优化与决策提供了统一的数学理论框架。
第二部分提供了研究随机模型的计算理论基础，包括Censoring不变性、RG-分解、RG-对偶性、谱分析、稳态计算、瞬态计算、渐近性分析、敏感性分析等。
第三部分研究了随机模型中的一些热点问题，例如拟平稳分布、连续状态马尔可夫过程、马尔可夫报酬过程、马尔可夫决策过程、演化博弈论等。
本书的读者对象为代数、应用概率、运筹学、管理科学、制造系统、计算机网络、交通系统、服务系统、生物工程等领域中高年级大学生、研究生、科技人员与工程技术人员。

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