

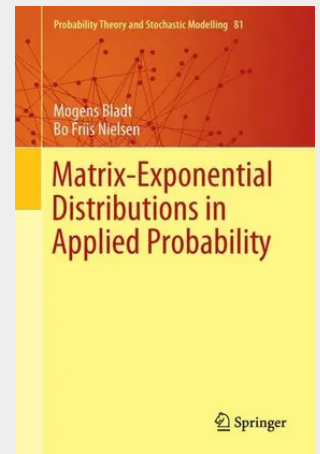
Matrix-Exponential Distributions in Applied Probability

This book contains an in-depth treatment of matrix-exponential (ME) distributions and their sub-class of phase-type (PH) distributions. Loosely speaking, an ME distribution is obtained through replacing the intensity parameter in an exponential distribution by a matrix. The ME distributions can also be identified as the class of non-negative distributions with rational Laplace transforms. If the matrix has the structure of a sub-intensity matrix for a Markov jump process we obtain a PH distribution which allows for nice probabilistic interpretations facilitating the derivation of exact solutions and closed form formulas.

The full potential of ME and PH unfolds in their use in stochastic modelling. Several chapters on generic applications, like renewal theory, random walks and regenerative processes, are included together with some specific examples from queueing theory and insurance risk. We emphasize our intention towards applications by including an extensive treatment on statistical methods for PH distributions and related processes that will allow practitioners to calibrate models to real data.

Aimed as a textbook for graduate students in applied probability and statistics, the book provides all the necessary background on Poisson processes, Markov chains, jump processes, martingales and re-generative methods. It is our hope that the provided background may encourage researchers and practitioners from other fields, like biology, genetics and medicine, who wish to become acquainted with the matrix-exponential method and its applications.

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106,99 €

99,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9781493970476

Medium: Buch

ISBN: 978-1-4939-7047-6

Verlag: Springer US

Erscheinungstermin: 19.05.2017

Sprache(n): Englisch

Auflage: 1. Auflage 2017

Serie: Probability Theory and Stochastic Modelling

Produktform: Gebunden

Gewicht: 13838 g

Seiten: 736

Format (B x H): 160 x 241 mm

