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Nota di contenuto	<ul> <li>Front Cover; Estimation of Rare Event Probabilities in Complex Aerospace and Other Systems: A Practical Approach; Copyright; Dedication; Contents; Preface; Foreword; Biography of the external contributors to this book; Abbreviations; Chapter 1: Introduction to rare event probability estimation; 1.1 The book purposes; 1.2 What are the events of interest considered in this book?; 1.3 The book organization; References; Part One: Essential Background in Mathematics and System Analysis; Chapter 2: Basics of probability and statistics; 2.1 Probability theory operators; 2.1.1 Elements of vocabulary</li> <li>2.1.2 Notion of dependence of random events andconditional probabilities 2.1.3 Continuous random variables; 2.1.3.1 Definitions;</li> <li>2.1.3.2 Parameters of continuous random variables; 2.1.4 Continuous multivariate random variables; 2.1.4.1 Definitions and theorems;</li> <li>2.1.4.2 Dependence of multivariate random variables ; 2.1.5 Point estimation ; 2.2 Random variable modeling; 2.2.1 Overview of common probability distributions; 2.2.1.1 Univariate distributions; Uniform distribution; Exponential distribution; Gaussian distribution; Truncated</li> </ul>

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Gaussian distribution; Log-normal distribution

Cauchy distributionChi-squared distribution; Gamma and beta distributions; Laplace distribution; Some properties of univariate distributions; 2.2.1.2 Multivariate distributions; Multivariate normal distribution; 2.2.2 Kernel-based laws; 2.3 Convergence theorems and sampling algorithms; 2.3.1 Strong law of large numbers; 2.3.2 Central limit theorem : 2.3.3 Simulation of complex laws using the Metropolis-Hastings algorithm: 2.3.3.1 Markov chain: 2.3.3.2 Some properties of transition kernels; 2.3.3.3 The Metropolis-Hastings algorithm ; 2.3.3.4 Transformation of random variables; References Chapter 3: The formalism of rare event probability estimation in complex systems3.1 Input-output system; 3.1.1 Description; 3.1.2 Formalism; 3.2 Time-variant system; 3.2.1 Description; 3.2.2 Formalism: 3.3 Characterization of a probability estimation: References; Part Two: Practical Overview of the Main Rare Event EstimationTechniques; Chapter 4: Introduction; 4.1 Categories of estimation methods; 4.2 General notations; 4.3 Description of the toy cases; 4.3.1 Identity function; 4.3.2 Polynomial square root function; 4.3.3 Four-branch system; 4.3.4 Polynomial product function; References Chapter 5: Simulation techniques5.1 Crude Monte Carlo; 5.1.1 Principle; 5.1.2 Application on a toy case; Four-branch system; 5.1.3 Conclusion: 5.2 Simple variance reduction techniques: 5.2.1 Quasi-Monte Carlo; 5.2.2 Conditional Monte Carlo; 5.2.2.1 Principle; 5.2.2.2

Conclusion; 5.2.3 Control variates; 5.2.3.1 Principle; 5.2.3.2 Application on a toy case; Four-branch system; 5.2.3.3 Conclusion; 5.2.4 Antithetic variates; 5.2.4.1 Principle; 5.2.4.2 Application to a toy case; Identity function; 5.2.4.3 Conclusion; 5.3 Importance sampling; 5.3.1 Principle of importance sampling

5.3.1 Finiciple of importance sampling

5.3.2 Nonadaptive importance sampling