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Communications -- 1.1.2 Probability, Random Variables, and Random Vectors -- 1.1.3 Random Sequences and Random Processes -- 1.1.4 Delta Functions -- 1.2 Deterministic Signals and Systems -- 1.2.1 Continuous Time -- 1.2.2 Discrete Time -- 1.2.3 Discrete-Time Filters -- 1.2.4 State-Space Realizations -- 1.3 Statistical Signal Processing with MATLAB® -- 1.3.1 Random Number Generation -- 1.3.2 Filtering -- Problems -- Further Reading -- PART I Probability, Random Variables, and Expectation -- 2 Probability Theory -- 2.1 Introduction -- 2.2 Sets and Sample Spaces -- 2.3 Set Operations -- 2.4 Events and Fields -- 2.5 Summary of a Random Experiment -- 2.6 Measure Theory -- 2.7 Axioms of Probability -- 2.8 Basic Probability Results -- 2.9 Conditional Probability -- 2.10 Independence -- 2.11 Bayes' Formula -- 2.12 Total Probability -- 2.13 Discrete Sample Spaces -- 2.14 Continuous Sample Spaces -- 2.15 Nonmeasurable Subsets of $\mathbb{R}$ -- Problems -- Further Reading -- 3 Random Variables -- 3.1 Introduction -- 3.2 Functions and Mappings -- 3.3 Distribution Function -- 3.4 Probability Mass Function -- 3.5 Probability Density Function -- 3.6 Mixed Distributions -- 3.7 Parametric Models for Random Variables -- 3.8 Continuous Random Variables -- 3.8.1 Gaussian Random Variable (Normal) -- 3.8.2 Log-Normal Random Variable -- 3.8.3 Inverse Gaussian Random Variable (Wald) -- 3.8.4 Exponential Random Variable (One-Sided) -- 3.8.5 Laplace Random Variable (Double-Sided Exponential) -- 3.8.6 Cauchy Random Variable -- 3.8.7 Continuous Uniform Random Variable -- 3.8.8 Triangular Random Variable -- 3.8.9 Rayleigh Random Variable -- 3.8.10 Rice Random Variable. -- 3.8.11 Gamma Random Variable (Erlang for $r = N$) -- 3.8.12 Beta Random Variable (Arcsine for $\alpha = 1/2$, Power Function for $\alpha = 1$) -- 3.8.13 Pareto Random Variable -- 3.8.14 Weibull Random Variable -- 3.8.15 Logistic Random Variable (Sigmoid for $\{ \alpha = 0, \beta = 1 \}$) -- 3.8.16 Chi Random Variable (Maxwell-Boltzmann, Half-Normal) -- 3.8.17 Chi-Square Random Variable -- 3.8.18 F-Distribution -- 3.8.19 Student's t Distribution -- 3.8.20 Extreme Value Distribution (Type I: Gumbel) -- 3.9 Discrete Random Variables -- 3.9.1 Bernoulli Random Variable -- 3.9.2 Binomial Random Variable -- 3.9.3 Geometric Random Variable (with Support $\mathbb{Z}^+$ or $\mathbb{N}$) -- 3.9.4 Negative Binomial Random Variable (Pascal) -- 3.9.5 Poisson Random Variable -- 3.9.6 Hypergeometric Random Variable -- 3.9.7 Discrete Uniform Random Variable -- 3.9.8 Logarithmic Random Variable (Log-Series) -- 3.9.9 Zeta Random Variable (Zipf) -- Problems -- Further Reading -- 4 Multiple Random Variables -- 4.1 Introduction -- 4.2 Random Variable Approximations -- 4.2.1 Binomial Approximation of Hypergeometric -- 4.2.2 Poisson Approximation of Binomial -- 4.2.3 Gaussian Approximations -- 4.2.4 Gaussian Approximation of Binomial -- 4.2.5 Gaussian Approximation of Poisson -- 4.2.6 Gaussian Approximation of Hypergeometric -- 4.3 Joint and Marginal Distributions -- 4.4 Independent Random Variables -- 4.5 Conditional Distribution -- 4.6 Random Vectors -- 4.6.1 Bivariate Uniform Distribution -- 4.6.2 Multivariate Gaussian Distribution -- 4.6.3 Multivariate Student's t Distribution -- 4.6.4 Multinomial Distribution -- 4.6.5 Multivariate Hypergeometric Distribution -- 4.6.6 Bivariate Exponential Distributions -- 4.7 Generating Dependent Random Variables -- 4.8 Random Variable Transformations -- 4.8.1 Transformations of Discrete Random Variables -- 4.8.2 Transformations of Continuous Random Variables. -- 4.9 Important Functions of Two Random Variables -- 4.9.1 Sum: $Z = X + Y$ -- 4.9.2 Difference: $Z = X - Y$ -- 4.9.3 Product: $Z = XY$ -- 4.9.4 Quotient (Ratio): $Z = X/Y$ -- 4.10 Transformations of Random Variable Families -- 4.10.1 Gaussian Transformations -- 4.10.2 Exponential

Transformations -- 4.10.3 Chi-Square Transformations -- 4.11
 Transformations of Random Vectors -- 4.12 Sample Mean and Sample
 Variance S^2 -- 4.13 Minimum, Maximum, and Order Statistics -- 4.14
 Mixtures -- Problems -- Further Reading -- 5 Expectation and
 Moments -- 5.1 Introduction -- 5.2 Expectation and Integration -- 5.3
 Indicator Random Variable -- 5.4 Simple Random Variable -- 5.5
 Expectation for Discrete Sample Spaces -- 5.6 Expectation for
 Continuous Sample Spaces -- 5.7 Summary of Expectation -- 5.8
 Functional View of the Mean -- 5.9 Properties of Expectation -- 5.10
 Expectation of a Function -- 5.11 Characteristic Function -- 5.12
 Conditional Expectation -- 5.13 Properties of Conditional Expectation
 -- 5.14 Location Parameters: Mean, Median, and Mode -- 5.15
 Variance, Covariance, and Correlation -- 5.16 Functional View of the
 Variance -- 5.17 Expectation and the Indicator Function -- 5.18
 Correlation Coefficients -- 5.19 Orthogonality -- 5.20 Correlation and
 Covariance Matrices -- 5.21 Higher Order Moments and Cumulants --
 5.22 Functional View of Skewness -- 5.23 Functional View of Kurtosis
 -- 5.24 Generating Functions -- 5.25 Fourth-Order Gaussian Moment
 -- 5.26 Expectations of Nonlinear Transformations -- Problems --
 Further Reading -- PART II Random Processes, Systems, and Parameter
 Estimation -- 6 Random Processes -- 6.1 Introduction -- 6.2
 Characterizations of a Random Process -- 6.3 Consistency and
 Extension -- 6.4 Types of Random Processes -- 6.5 Stationarity -- 6.6
 Independent and Identically Distributed -- 6.7 Independent Increments
 -- 6.8 Martingales.
 6.9 Markov Sequence -- 6.10 Markov Process -- 6.11 Random
 Sequences -- 6.11.1 Bernoulli Sequence -- 6.11.2 Bernoulli Scheme --
 6.11.3 Independent Sequences -- 6.11.4 Bernoulli Random Walk --
 6.11.5 Binomial Counting Sequence -- 6.12 Random Processes --
 6.12.1 Poisson Counting Process -- 6.12.2 Random Telegraph Signal
 -- 6.12.3 Wiener Process -- 6.12.4 Gaussian Process -- 6.12.5 Pulse
 Amplitude Modulation -- 6.12.6 Random Sine Signals -- Problems --
 Further Reading -- 7 Stochastic Convergence, Calculus, and
 Decompositions -- 7.1 Introduction -- 7.2 Stochastic Convergence --
 7.3 Laws of Large Numbers -- 7.4 Central Limit Theorem -- 7.5
 Stochastic Continuity -- 7.6 Derivatives and Integrals -- 7.7
 Differential Equations -- 7.8 Difference Equations -- 7.9 Innovations
 and Mean-Square Predictability -- 7.10 Doob-Meyer Decomposition --
 7.11 Karhunen-Loève Expansion -- Problems -- Further Reading -- 8
 Systems, Noise, and Spectrum Estimation -- 8.1 Introduction -- 8.2
 Correlation Revisited -- 8.3 Ergodicity -- 8.4 Eigenfunctions of $R_{XX}()$
 -- 8.5 Power Spectral Density -- 8.6 Power Spectral Distribution -- 8.7
 Cross-Power Spectral Density -- 8.8 Systems with Random Inputs --
 8.8.1 Nonlinear Systems -- 8.8.2 Linear Systems -- 8.9 Passband
 Signals -- 8.10 White Noise -- 8.11 Bandwidth -- 8.12 Spectrum
 Estimation -- 8.12.1 Periodogram -- 8.12.2 Smoothed Periodogram --
 8.12.3 Modified Periodogram -- 8.13 Parametric Models -- 8.13.1
 Autoregressive Model -- 8.13.2 Moving-Average Model -- 8.13.3
 Autoregressive Moving-Average Model -- 8.14 System Identification --
 Problems -- Further Reading -- 9 Sufficient Statistics and Parameter
 Estimation -- 9.1 Introduction -- 9.2 Statistics -- 9.3 Sufficient
 Statistics -- 9.4 Minimal Sufficient Statistic -- 9.5 Exponential Families
 -- 9.6 Location-Scale Families -- 9.7 Complete Statistic -- 9.8 Rao-
 Blackwell Theorem.
 9.9 Lehmann-Scheffé Theorem -- 9.10 Bayes Estimation -- 9.11 Mean-
 Square-Error Estimation -- 9.12 Mean-Absolute-Error Estimation --
 9.13 Orthogonality Condition -- 9.14 Properties of Estimators --
 9.14.1 Unbiased -- 9.14.2 Consistent -- 9.14.3 Efficient -- 9.15

Maximum A Posteriori Estimation -- 9.16 Maximum Likelihood Estimation -- 9.17 Likelihood Ratio Test -- 9.18 Expectation-Maximization Algorithm -- 9.19 Method of Moments -- 9.20 Least-Squares Estimation -- 9.21 Properties of LS Estimators -- 9.21.1 Minimum WLS -- 9.21.2 Uniqueness -- 9.21.3 Orthogonality -- 9.21.4 Unbiased -- 9.21.5 Covariance Matrix -- 9.21.6 Efficient: Achieves CRLB -- 9.21.7 BLU Estimator -- 9.22 Best Linear Unbiased Estimation -- 9.23 Properties of BLU Estimators -- Problems -- Further Reading -- A Note on Part III of the Book -- APPENDICES Introduction to Appendices -- A Summaries of Univariate Parametric Distributions -- A.1 Notation -- A.2 Further Reading -- A.3 Continuous Random Variables -- A.3.1 Beta (Arcsine for $\alpha = 1/2$, Power Function for $\alpha = 1$) -- A.3.2 Cauchy -- A.3.3 Chi -- A.3.4 Chi-Square -- A.3.5 Exponential (Shifted by c) -- A.3.6 Extreme Value (Type I: Gumbel) -- A.3.7 F-Distribution -- A.3.8 Gamma (Erlang for $r = N$ with $(r) = (r - 1)!$) -- A.3.9 Gaussian (Normal) -- A.3.10 Half-Normal (Folded Normal) -- A.3.11 Inverse Gaussian (Wald) -- A.3.12 Laplace (Double-Sided Exponential) -- A.3.13 Logistic (Sigmoid for $\alpha = 0, \beta = 1$) -- A.3.14 Log-Normal -- A.3.15 Maxwell-Boltzmann -- A.3.16 Pareto -- A.3.17 Rayleigh -- A.3.18 Rice -- A.3.19 Student's t Distribution -- A.3.20 Triangular -- A.3.21 Uniform (Continuous) -- A.3.22 Weibull -- A.4 Discrete Random Variables -- A.4.1 Bernoulli (with Support $\{0, 1\}$) -- A.4.2 Bernoulli (Symmetric with Support $\{-1, 1\}$) -- A.4.3 Binomial -- A.4.4 Geometric (with Support $\mathbb{Z}^+$) -- A.4.5 Geometric (Shifted with Support $\mathbb{N}$) -- A.4.6 Hypergeometric.

Sommario/riassunto

Probability, Random Variables, and Random Processes is a comprehensive textbook on probability theory for engineers that provides a more rigorous mathematical framework than is usually encountered in undergraduate courses. It is intended for first-year graduate students who have some familiarity with probability and random variables, though not necessarily of random processes and systems that operate on random signals. It is also appropriate for advanced undergraduate students who have a strong mathematical background. The book has the following features: Several appendices include related material on integration, important inequalities and identities, frequency-domain transforms, and linear algebra. These topics have been included so that the book is relatively self-contained. One appendix contains an extensive summary of 33 random variables and their properties such as moments, characteristic functions, and entropy. Unlike most books on probability, numerous figures have been included to clarify and expand upon important points. Over 600 illustrations and MATLAB plots have been designed to reinforce the material and illustrate the various characterizations and properties of random quantities. Sufficient statistics are covered in detail, as is their connection to parameter estimation techniques. These include classical Bayesian estimation and several optimality criteria: mean-square error, mean-absolute error, maximum likelihood, method of moments, and least squares. The last four chapters provide an introduction to several topics usually studied in subsequent engineering courses: communication systems and information theory; optimal filtering (Wiener and Kalman); adaptive filtering (FIR and IIR); and antenna beamforming, channel equalization, and direction finding. This material is available electronically at the companion website. Probability, Random Variables, and Random Processes is the only textbook on probability for engineers that includes relevant background material, provides extensive summaries of key results, and extends various statistical techniques to a range of applications in signal processing.
