



An Introduction to Statistical Communication Theory: An IEEE Press Classic Reissue

By David Middleton

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This IEEE Classic Reissue provides at an advanced level, a uniquely fundamental exposition of the applications of Statistical Communication Theory to a vast spectrum of important physical problems. Included are general analysis of signal detection, estimation, measurement, and related topics involving information transfer.

Using the statistical Bayesian viewpoint, renowned author David Middleton employs statistical decision theory specifically tailored for the general tasks of signal processing. Dr. Middleton also provides a special focus on physical modeling of the canonical channel with real-world examples relating to radar, sonar, and general telecommunications. This book offers a detailed treatment and an array of problems and results spanning an exceptionally broad range of technical subjects in the communications field.

Complete with special functions, integrals, solutions of integral equations, and an extensive, updated bibliography by chapter, *An Introduction to Statistical Communication Theory* is a seminal reference, particularly for anyone working in the field of communications, as well as in other areas of statistical physics. (Originally published in 1960.)

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Editorial Review

From the Back Cover

"...a unique sourcebook in statistical communications...no other book treats mathematical and physical foundations of the discipline in the comprehensive, interdisciplinary way found here...[it] offers the reader a distinct advantage in terms of understanding, as well as a significant value in terms of compactness of resources."

—From the foreword by H. Vincent Poor

This IEEE Press Classic Reissue provides an advanced level, yet uniquely fundamental, treatment of the applications of Statistical Communication Theory to a vast spectrum of important physical problems. Included are general treatments of signal detection, estimation, and measurement, and related topics involving information transfer. Using the Bayesian statistical viewpoint, renowned author David Middleton employs statistical decision theory specifically tailored for the general tasks of signal processing. Dr. Middleton also provides a special focus on physical modeling of the canonical channel with real-world examples relating to radar, sonar, and general telecommunications applications. This book offers a detailed treatment and an array of problems and results covering an exceptionally broad range of technical subjects in the communications field, including among others:

- Specific applications of Fourier as well as single- and two-sided LaPlace transform methods
- Evaluation of covariance functions and intensity spectra
- Signal-to-noise ratios in nonlinear systems
- Sampling and interpolation
- Langevin, Fokker-Planck, and Boltzmann equations
- Amplitude, phase, and frequency modulation by noise and signals
- Detection probabilities
- Optimum estimators
- Minimum detectable signals
- Neyman-Pearson and Ideal Observer detection algorithms
- Multiple alternative detection algorithms and performance measures

Complete with special functions, integrals, solutions of integral equations, and an extensive, updated bibliography, *An Introduction to Statistical Communication Theory* is a seminal reference particularly for anyone working in the field of communications, as well as in other areas of statistical physics.

About the Author

David Middleton is a consulting physicist, applied mathematician, educator and author who is an internationally recognized pioneer in statistical communication theory, a field in which he has been active for more than fifty years. He is author of *Topics in Communication Theory* (1965–1967, 1987-) and more than 160 papers. Dr. Middleton is currently Adjunct Professor of Electrical Engineering at the University of Rhode Island.

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