



# Fundamentals of Statistical Signal Processing, Volume I: Estimation Theory (v. 1)

By Steven M. Kay

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A unified presentation of parameter estimation for those involved in the design and implementation of statistical signal processing algorithms. Covers important approaches to obtaining an optimal estimator and analyzing its performance; and includes numerous examples as well as applications to real-world problems. **MARKETS:** For practicing engineers and scientists who design and analyze signal processing systems, i.e., to extract information from noisy signals — radar engineer, sonar engineer, geophysicist, oceanographer, biomedical engineer, communications engineer, economist, statistician, physicist, etc.

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### **Editorial Review**

#### **Amazon.com Review**

This text is geared towards a one-semester graduate-level course in statistical signal processing and estimation theory. The author balances technical detail with practical and implementation issues, delivering an exposition that is both theoretically rigorous and application-oriented. The book covers topics such as minimum variance unbiased estimators, the Cramer-Rao bound, best linear unbiased estimators, maximum likelihood estimation, recursive least squares, Bayesian estimation techniques, and the Wiener and Kalman filters. The author provides numerous examples, which illustrate both theory and applications for problems such as high-resolution spectral analysis, system identification, digital filter design, adaptive beamforming and noise cancellation, and tracking and localization. The primary audience will be those involved in the design and implementation of optimal estimation algorithms on digital computers. The text assumes that you have a background in probability and random processes and linear and matrix algebra and exposure to basic signal processing. Students as well as researchers and practicing engineers will find the text an invaluable introduction and resource for scalar and vector parameter estimation theory and a convenient reference for the design of successive parameter estimation algorithms.

#### **From the Back Cover**

For those involved in the design and implementation of signal processing algorithms, this book strikes a balance between highly theoretical expositions and the more practical treatments, covering only those approaches necessary for obtaining an optimal estimator and analyzing its performance. Author Steven M. Kay discusses classical estimation followed by Bayesian estimation, and illustrates the theory with numerous pedagogical and real-world examples. Special features include over 230 problems designed to reinforce basic concepts and to derive additional results; summary chapter containing an overview of all principal methods and the rationale for choosing a particular one; unified treatment of Wiener and Kalman filtering; estimation approaches for complex data and parameters; and over 100 examples, including real-world applications to high resolution spectral analysis, system identification, digital filter design, adaptive noise cancelation, adaptive beamforming, tracking and localization, and more. Students as well as practicing engineers will find Fundamentals of Statistical Signal Processing an invaluable introduction to parameter estimation theory and a convenient reference for the design of successful parameter estimation algorithms.

### **Users Review**

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