SPECTRAL ANALYSIS OF SIGNALS

PETRE STOICA ▲ RANDOLPH MOSES

The world of signals that surround us is often more conveniently understood and analyzed in the frequency domain than in the time domain. Spectral analysis, which allows us to mathematically analyze signals in the frequency domain, is a topic of importance to many applications in engineering, statistics, geophysics, biology, econometrics, and medicine.

This book can be used as a text in advanced undergraduate or graduate courses, as a self-study guide, or as a reference for researchers. The text, which is concise and self-contained by design, comes with a host of learning and teaching aids, including an extensive set of analytical and computer problems that cover topics of practical interest, a detailed presentation on overhead transparencies, and a Solutions Manual. Additionally, for researchers the book contains a number of advanced sections in each chapter.

The main topics covered are:

- Basic concepts: autocorrelation; energy and power spectra.
- Nonparametric Spectral Analysis: periodogram and correlogram; window-based techniques.
- Rational Spectral Analysis: autoregressive, moving average, and autoregressive moving average methods.
- Line Spectral Analysis: least squares, Yule–Walker, and subspace-based methods.
- Filter-Bank Methods: refined filter banks; the Capon method
- Array Signal Processing: beamforming; the Capon method; parametric direction of arrival estimation.

The book also contains three appendices, giving summaries of main results in Matrix Analysis, Cramér–Rao Bound Theory, and Model Order Selection. An extensive bibliography, grouped by topic, provides links to both classical results and recent literature.

PEARSON Prentice Hall

Upper Saddle River, NJ 07458
www.prenhall.com

ISBN 0-13-113956-8
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