Wavelets Through A Looking Glass: The World of the Spectrum

Ola Bratteli and Palle Jorgensen

This book combining wavelets and the world of the spectrum focuses on recent developments in wavelet theory, emphasizing fundamental and relatively timeless techniques that have a geometric and spectral-theoretic flavor. The exposition is clearly motivated and unfolds systematically, aided by numerous graphics.

Key features of the book:

- The important role of the spectrum of a transfer operator is studied
- Excellent graphics show how wavelets depend on the spectra of the transfer operators
- Key topics of wavelet theory are examined: connected components in the variety of wavelets, the geometry of winding numbers, the Galerkin projection method, classical functions of Weierstrass and Hurwitz and their role in describing the eigenvalue-spectrum of the transfer operator, isospectral families of wavelets, spectral radius formulas for the transfer operator, PerronFrobenius theory, and quadrature mirror filters
- New, previously unpublished results appear on the homotopy of multiresolutions, approximation theory, and the spectrum and structure of the fixed points of the associated transfer and subdivision operators
- Concise background material for each chapter, open problems, exercises, bibliography, and comprehensive index make this a fine pedagogical and reference resource.

This self-contained book deals with the tools for important applications to signal processing, communications engineering, computer graphics algorithms, qubit algorithms and chaos theory, and is aimed at a broad readership of graduate students, practitioners, and researchers in applied mathematics and engineering. The book is also useful for other mathematicians with an interest in the interface between mathematics and communication theory.

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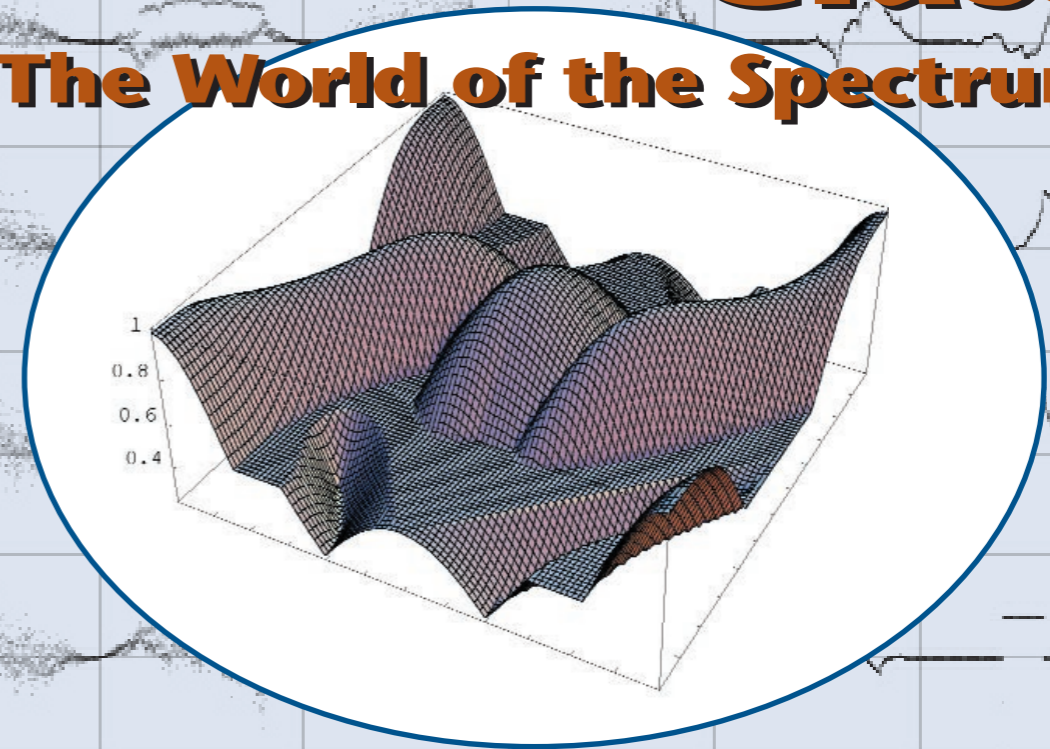ISBN-0-8176-4280-3
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