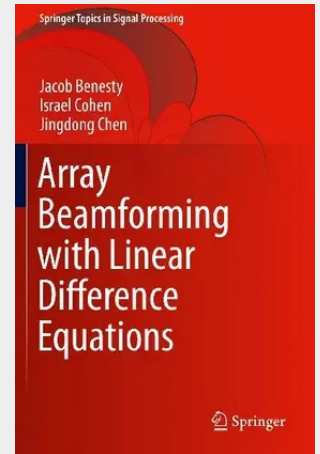


Array Beamforming with Linear Difference Equations

This book studies the link between differential beamforming and differential equations which in turn enables the study of fundamental theory and methods of beamforming from a different perspective, leading to new insights into the problem and new methods to solve the problem. The book first presents a brief overview of the problems and methods for beamforming and some performance measures popularly used either to evaluate beamformers or to derive optimal beamformers. Then, first-order, second-order, and general high-order linear difference equations are discussed, based on which the authors show how to formulate the beamforming problem and derive different beamforming methods, including fixed and adaptive ones. Furthermore, the authors show how to apply the theory of difference equations to the general problem of speech enhancement, and deduce a number of noise reduction filters, including the maximum SNR filter, the Wiener filter, the MVDR filter, etc. Also covered in the book are the difference equations and differential beamforming from the spectral graph perspective.

- Presents basic concepts, fundamental principles, and methods for beamforming from the perspective of linear difference equations;
- Provides formulation and methods of conventional beamforming, and first-order, second-order, and general high-order linear difference equations for beamforming;
- Includes the applications of linear difference equations to the problem of noise reduction;
- Explains beamforming based on difference equations with graphs.

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