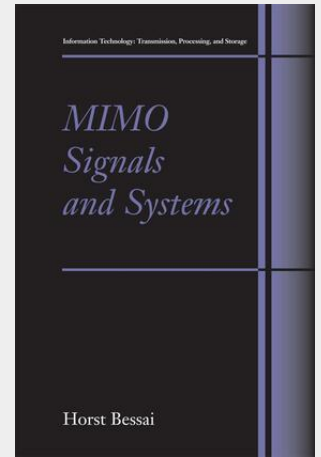


## MIMO Signals and Systems

This text evolved from notes used to teach two-semester courses on multi-port signals and systems theory and vector-valued signal transmission to third-year electrical and computer engineering students. It is also based on the author's tutorial courses on the subject presented to practicing engineers in industry. The primary motivation has been to familiarize the reader with the essential tools and methods used to describe the dynamic behavior of electrical multiple-input multiple-output (MIMO) systems. The book shall provide a basic understanding of the fundamentals, implementation, and of MIMO techniques. For easier comprehension, these applications techniques, in conjunction with several "classic" algorithms, are illustrated by means of numerous worked examples. MATLAB, a matrix-oriented commercial software package with user-friendly interfaces and excellent graphics support, was chosen to perform numerical analyses. MATLAB is very easy to learn and de facto a worldwide standard programming language in universities and industry. End-of chapter problems are added to provide additional training opportunities and to reinforce the knowledge gained. Over the last decade, spurred by the invention of a series of fundamentally new wireless transmission concepts, MIMO theory has been transformed into one of the most vibrant and active research areas. Communications engineers continue to produce - at an unprecedented high speed - more accurate radio channel models. Spectral efficiencies of actually working systems are reported as high as 20 bits/s/Hz. Information theorists are eager to find more accurate formulas describing capacity bounds for communication systems with multiple transmit and/or receive antennas.

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