



# Blind Identification and Separation of Complex-valued Signals

*Eric Moreau, Tulay Adali*

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## **Blind Identification and Separation of Complex-valued Signals** Eric Moreau, Tulay Adali

Blind identification consists of estimating a multi-dimensional system only through the use of its output, and source separation, the blind estimation of the inverse of the system. Estimation is generally carried out using different statistics of the output.

The authors of this book consider the blind identification and source separation problem in the complex-domain, where the available statistical properties are richer and include non-circularity of the sources – underlying components. They define identifiability conditions and present state-of-the-art algorithms that are based on algebraic methods as well as iterative algorithms based on maximum likelihood theory.

### Contents

1. Mathematical Preliminaries.
2. Estimation by Joint Diagonalization.
3. Maximum Likelihood ICA.

### About the Authors

Eric Moreau is Professor of Electrical Engineering at the University of Toulon, France. His research interests concern statistical signal processing, high order statistics and matrix/tensor decompositions with applications to data analysis, telecommunications and radar.

Tülay Adali is Professor of Electrical Engineering and Director of the Machine Learning for Signal Processing Laboratory at the University of Maryland, Baltimore County, USA. Her research interests concern statistical and adaptive signal processing, with an emphasis on nonlinear and complex-valued signal processing, and applications in biomedical data analysis and communications.

Blind identification consists of estimating a multidimensional system through the use of only its output. Source separation is concerned with the blind estimation of the inverse of the system. The estimation is generally performed by using different statistics of the outputs.

The authors consider the blind estimation of a multiple input/multiple output (MIMO) system that mixes a number of underlying signals of interest called sources. They also consider the case of direct estimation of the inverse system for the purpose of source separation. They then describe the estimation theory associated with the identifiability conditions and dedicated algebraic algorithms. The algorithms depend critically on (statistical and/or time frequency) properties of complex sources that will be precisely described.

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