

Time and place: Wednesday, 02.05.2018, 13:00, Sr H 2507

Title: The Partial Relaxation Approach: An Eigenvalue-Based DOA Estimator Framework

Speaker: Prof. Marius Pesavento, TU Darmstadt

Abstract: In this talk, we introduce the partial relaxation approach for direction-of-arrival estimation. Unlike existing spectral search methods like Capon or MUSIC which can be considered as single source approximations of multi-source estimation criteria, the proposed approach accounts for the existence of multiple sources. At each considered direction, the manifold structure of the remaining interfering signals impinging on the sensor array is relaxed, which results in closed form estimates for the interference parameters. The conventional multidimensional optimization problem reduces, thanks to this relaxation, to a simple spectral search. Following this principle, we propose estimators based on the Deterministic Maximum Likelihood, Weighted Subspace Fitting and covariance fitting methods. To calculate the pseudo-spectra efficiently, an iterative rooting scheme based on the rational function approximation is applied to the partial relaxation methods. Simulation results show that the performance of the proposed estimators is superior to the conventional methods especially in the case of low Signal-to-Noise-Ratio and low number of snapshots, irrespectively of any specific structure of the sensor array while maintaining a comparable computational cost as MUSIC.

Biography: Marius Pesavento received the Dipl.Ing. and M.Eng. degrees from Ruhr-University Bochum, Bochum, Germany, and McMaster University, Hamilton, ON, Canada, in 1999 and 2000, respectively, and the Dr. Ing. degree in electrical engineering from Ruhr-University Bochum, in 2005. Between 2005 and 2009, he held research positions in two start-up companies in ICT. In 2010, he became a Professor for Communication Systems in the Department of Electrical Engineering and Information Technology, at the Technical University Darmstadt, Germany. His research interests include robust signal processing and adaptive beamforming, high-resolution sensor array processing, multiantenna and multiuser communication systems, distributed, sparse, and mixed-integer optimization techniques for signal processing, communications and machine learning, statistical signal processing, spectral analysis, and parameter estimation. He was the recipient of the 2003 ITG/VDE Best Paper Award, the 2005 Young Author Best Paper Award of the IEEE Transactions on Signal Processing. He is a Member of the Editorial Board for the EURASIP Signal Processing Journal, the Special Area Teams "Signal Processing for Communications and Networking" and "Signal Processing for Multisensor Systems" of the EURASIP and served as an Associate Editor for the IEEE in the term 2012–2016 and as a Member of the Sensor Array and Multichannel Technical Committee of the IEEE Signal Processing Society in the term 2012-2017.