

Advances in Sensor Array Signal Processing

Professor Yuanliang MA

Chairman of the academic committee
Northwestern Polytechnic University
CHINA

Abstract

Recent advances in sensor array signal processing will be addressed with emphases on the contributions from the author's group. Firstly, a brief review on the scientific coverage and importance of the subject will be given. The landmarks of its development and recent hot-topics will be outlined. In which, Robust Array Processing, Blind Processing, Generalized Beamforming for passive source localization (or Matched Field Processing), and Spherical mode decomposition techniques will be emphasized. In the following, the contributions of the author's group are introduced with detail, including several aspects: (1) Notch Noise Field Method (NNFM) for beam pattern synthesis suitable to sensor arrays of arbitrary shape and configuration; (2) Practical Array Calibration and Beampattern Restoration through array manifold measurement; (3) Multiple-Constraint Array Optimization through Second-Order Cone Programming; (4) Exact Superdirectivity Solution for idealized circular array of equal-spaced sensors; (5) Frequency-Time Combined Optimization for constant beamwidth synthesis; (6) Beam Domain Processing for spatial high resolution and interference suppression; (7) Generalized Spatial Filtering for discrete interference suppression or 3-D interference removal; (8) Extension to a projecting conformal array.

Biography

Yuanliang Ma was born in 1938 in Sichuan Province, P.R. China. He graduated in underwater acoustics from Northwestern Polytech. Univ.(NPU) Xi'an, China, in 1961. Since then he has been working on underwater acoustics and signal processing. From 1981 to 1983, he was a visiting scholar with the Dept. of EE, Loughborough University, England. He became an associate professor in 1980, and full professor in 1985 with NPU. He was a vice-president of the Acoustic Society of China, 1998-2006. His publications include three books on underwater acoustic transducers, array signal processing, and adaptive active noise control in addition to over 300 journal and conference papers. His current research interests are in sensor array signal processing, ocean acoustics, microwave transmission, and signal processing systems.

Prof. Ma is a member of the Chinese Academy of Engineering and currently the Chairman of the academic committee of NPU, associate editor of Chinese Science Bulletin.