
Mismatched Filter Design and Interference Mitigation for MIMO Radars

Abstract:

MIMO radar receivers need to reliably separate waveforms originating from different transmitters while suppressing interference for effective operation. In order to achieve this goal, mismatched filters may be employed at the receivers. By using mismatched filters, it is possible to reduce the power of the interference while strictly controlling the autocorrelation sidelobe and peak cross-correlation levels of the received waveforms. In this paper, we propose a mismatched filter design method that minimizes interference and jamming power at the filter output while the peak sidelobe and cross-correlation levels for all Doppler frequencies are constrained to desired values. The proposed design method is formulated as an optimization problem employing sum-of-squares representation of nonnegative polynomials and solved using semidefinite relaxation. It is demonstrated that good interference suppression performance is achieved even when using an estimated covariance matrix.