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Research Article

Enhanced Radar Imaging in Uncertain Environment: A Descriptive Experiment Design Regularization Approach

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Abstract

A new robust technique for high-resolution reconstructive imaging sensing (RS) with imaging array radar or/and synthetic aperture radar (SAR) in uncertain environment. The operational scenario uncertainties are associated with signal formation operator (SFO) in turbulent medium, imperfect measurements, uncontrolled antenna vibrations, and random carrier phase errors. We propose new descriptive experiment design regularization (DED) for image reconstruction problems. The proposed DEDR incorporates the experiment design-motivated operational case statistical performance (WCSP) optimization-based regularization. The WCSP information, and the robust DEDR image reconstruction rank uncertain estimated data correlation matrices is found. We demonstrate the enhancement of the uncertain SAR imagery indicative of the signal with the developed approach.