

Advanced Radar Signal Processing and Information Extraction

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Abstract

This talk will cover four emerging signal processing methods that form part of the underpinning research methodology for workpackage 4 (MIMO and Distributed Sensing) of the LSSC consortium workplan. Firstly the Fractional Fourier Transform (**FrFT**) will be shown to be a natural replacement for the conventional FFT in chirp based remote sensing systems. Resulting FrFT based SAR algorithms will be shown to provide enhanced resolution capability on real SAR datasets. Furthermore FrFT filtering will be shown to offer enhanced robustness to jamming interference in monopulse tracking radars. Secondly Empirical Mode Decomposition (**EMD**) will be suggested as a possible alternative to the conventional Fourier or Wavelet decomposition approaches. EMD will be seen to be effective in dealing with high power jamming interference. A hybrid EMD-FrFT filtering approach will be presented for jamming interference suppression in monopulse radars. Thirdly 1-D Local Binary Pattern (**LBP**) will be investigated. Resulting 1-D LBP based systems will be shown to be particularly effective for event onset detection for applications that include speech processing and surface EMG processing for gesture analysis. The fourth part of the talk will concentrate on the Singular Spectrum Analysis (**SSA**). It will be shown that SSA is particularly useful in microdoppler signature extraction from passive bistatic radars for helicopter identification.