

“Exploiting a diversity idea to get rid of secondary data: design and analysis of an adaptive detection scheme”, pp.16-22

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Abstract – This paper addresses adaptive radar detection of possibly range-spread, fixed targets based upon range-compressed Synthetic Aperture Radar data. Detection of coherent target echoes embedded in Gaussian noise with unknown covariance matrix is attacked without resorting to secondary data, namely data free of signal components, but sharing the spectral properties of those under test. To this end, the unknown covariance matrix of the noise is approximated by a block diagonal one with identical diagonal blocks and the common block is estimated from a set of subvectors obtained by filtering out possible signal components from data under test. The proposed detector guarantees the Constant False Alarm Rate property with respect to the noise power. Moreover, its threshold setting seems not very sensitive to the actual structure of the covariance matrix. Finally, the performance assessment shows that it might represent a viable means to deal with uncertain scenarios.