Comparative Study of TOA Based Emitter Deinterleaving and Tracking Algorithms

Kaveer Manickchand; J.J. Strydom; and A.K. Mishra

Abstract
The goal of this study was to research TOA exclusive tracking and deinterleaving algorithms applied to radar emitters in an EW environment for application on FPGA-based DRFM platforms. In this paper sequence search (SS), TOA difference histogram, CDIF, SDIF, CDIF with SS (CDIF SS) and SDIF with SS (SDIF SS) deinterleaving algorithms were investigated. The TOA tracking algorithms that were investigated were the Delta-τ histogram, alpha-beta filter and Kalman filter. The performance of all the algorithms were evaluated within a simulated EW environment, in which TOA measurement noise, number of emitters and interference pulses (missing and spurious) were varied. The work has shown that the best performing deinterleaving algorithms in simulations were found to be the CDIF & CDIF SS algorithms. These deinterleaving algorithms performed consistently well compared to the other algorithms in all the tested scenarios. The best performing tracking algorithms in simulations were found to be the Delta-t histogram & alphabeta filter algorithms. These two algorithms were favoured over the Kalman filter as the increase in performance could not justify the longer processing time. Final comparison on the FPGA-based hardware platforms showed that the CDIF SS was the best deinterleaving algorithm and the best tracking algorithm was the alpha-beta filter.