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Highly Accurate Target Motion Compensation Using Entropy Function Minimization

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Abstract : One of the defects of stepped frequency radar systems is their sensitivity to target motion. In such systems, target motion causes range cell shift, false peaks, Signal to Noise Ratio (SNR) reduction and range profile spreading because of power spectrum interference of each range cell in adjacent range cells which induces distortion in High Resolution Range Profile (HRRP) and disrupt target recognition process. Thus Target Motion Parameters (TMPs) effects compensation should be employed. In this paper, such a method for estimating TMPs (velocity and acceleration) and consequently eliminating or suppressing the unwanted effects on HRRP based on entropy minimization has been proposed. This method is carried out in two major steps: in the first step, a discrete search method has been utilized over the whole acceleration-velocity lattice network, in a specific interval seeking to find a less-accurate minimum point of the entropy function. Then in the second step, a 1-D search over velocity is done in locus of the minimum for several constant acceleration lines, in order to enhance the accuracy of the minimum point found in the first step. The provided simulation results demonstrate the effectiveness of the proposed method.

Keywords : automatic target recognition (ATR), high resolution range profile (HRRP), motion compensation, stepped frequency waveform technique (SFW), target motion parameters (TMPs)
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