Analysis of the Response Function Parameters at Optimum Weight Processing for Signals with Linear Frequency Modulation

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Abstract. The article studies the features of an optimum weight function derived for the received pulse signal with linear frequency modulation with a big signal base and the unknown set of reflected signals by the maximum useful signal-to-noise criterion at ortogonalization of the weight function of a part of the received interfering signals lying in the area of considerable side lobes of the correlation function.

The effectiveness of processing is evaluated according to the whole set of possible interfering signals.

The aim of the work is to increase the operation effectiveness of the system by finding the recommended characteristics of the algorithm for processing the reflected signal with linear frequency modulation, such as the limiting zone of the maximum suppression and boundary points.

The analysis of the obtained data showed that the K indicator largely influences the window function. For its optimal values, there is no correlation of the losses from the width of the maximum suppression zone (M-zone). A negligible decline appears only on the boarders of the range. For a greater (undesirable) K indicator, a considerable correlation of the useful signal level from the M zone value and from the signal duration (it worsens about twice) can be seen. The maximum value of the weight function decreases with the increase in the signal duration, and a linear dependence at the (undesirable) value $K = 1{,}36$ occurs. The field of application of the results obtained is quite wide: from optimization of the range and velocity measuring unit algorithms working under interference conditions to definition of amplitude-phase distribution in active phase-arrayed antennas for getting the necessary attenuation on side lobes of the antenna radiation pattern.

Keywords: docking, multipath propagation, mismatched filtration, linear frequency modulation, zone of maximum suppression