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Methods of Forming Classified Training Sample for Adaptation of Weight Coefficient of Automatic Interference Compensator[1]

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Abstract—The problem of analyzing various methods for the formation of the classified training sample that ensure the effective operation of the automatic compensator for active interferences with simultaneous presence of passive interference is solved in this paper. For the first time an adaptive method for the formation of the classified training sample based on the use of threshold estimation of the interchannel correlation coefficient of the combined interference is proposed. An adaptive method for the formation of the classified training sample based on the current interval estimation of the distribution of the passive component of the combined interference in range (time) is also proposed. The method provides an estimation of the coefficient of interchannel correlation with the selection of the maximum value and its utilization for the formation of weight coefficients in the following probing period. Experiment in the testing ground is conducted with a quantitative estimation of the cancellation ratio of active interference for the formation of the classification sample using spectral differences in the structure of active and passive interferences.

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INTRODUCTION

To protect radars from the influence of active masking interference (AMI), both spatial and polarization differences in the structure of useful and interference signals can be used [1–3]. Spatial filtering of signals is predominantly used for the action of AMIs acting along the side lobes of the antenna radiation pattern (ARP). Polarization filtering is used to protect radar signals from interference acting in the direction of the main lobe of the ARP. As an element of adaptation of the spatial or polarization filters, various types of automatic interference compensators (AIC) or adaptive antenna arrays (AAA) are used.

In earlier studies, continuous algorithms for adapting the weight coefficients of AIC in the radar design were used [1, 4, 5]. However, the conducted studies showed that when the AMI and passive interference are combined, the spatially-distributed nature of the latter destroys the spatial correlation of point sources of AMI [2, 3]. Hence, the problem of forming a classified training sample for the adaptation of the weighting coefficients of the AIC, generated only by AMI, appeared.

1. PROBLEM DESCRIPTION

Optimum signal processing in a background of combined interferences in case of using AAA can be provided by a shared (non-separable) space-time processing with simultaneous compensation of active and passive interferences. However, its implementation even on the modern element base is extremely difficult [6]. Therefore, in the direction-finding radars a two-stage signal processing procedure is used. At the same

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