

短文与研究通讯

一种空域-极化域联合的雷达欺骗干扰抑制算法

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摘要:

现代电子战中雷达有源欺骗干扰,特别是转发式欺骗干扰,已对雷达构成了严重的威胁。本文针对阵列雷达中有源欺骗干扰抑制问题,研究了一种空域-极化域联合处理的抑制方法。该方法采用矩阵法测量目标和干扰的空域及极化域参数;然后借助子空间投影理论构建滤波算子;进而在由空域和极化域组成的联合域上滤除欺骗干扰并提取目标回波,从而达到干扰抑制的目标。该算法采用信干噪比改善因子来衡量其性能,同时推导了改善因子的理论上限。该算法具有较低的复杂度,大量计算机仿验证其性能。仿真结果表明,算法不仅有良好的欺骗干扰抑制效果,并且在一定程度上也抑制了噪声;当SNR>10dB,参数估计相对误差小于0.1,抑制前后回波相关系数大于90%,干扰和噪声抑制度大于10dB。

关键词: 参数估计; 欺骗干扰抑制; 滤波算子

An Algorithm of Radar Deception Jamming Suppression Based on the Joint Processing in Spatial and Polarizational Domains

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Abstract:

In the modern radar electronic warfare, the threat of radar active deception jamming is more serious to radar system. When an array radar is under the jamming, it can't to detect and track the real target. To solve this problem, a suppression method in spatial and polarization domains is presented in this paper. Firstly, the parameters of target and jamming such as direction of arrival (DOA) and polarization parameter are measured by matrix method. Then, the filter operator is constructed in the two domains based on the space projection. At last, with the help of the filter operator, the jamming is eliminated while the target echo is extracted. The performance of algorithm is appraised by the improvement factor of signal to jamming and noise ratio, and the upper limit of this ratio is reduced. Moreover, the algorithm has low computation. The simulations show that the algorithm can not only suppress deception jamming effectively but also noise to an extent. In the case of SNR>10dB, the relative error of parameter estimation is less than 0.1, the correlation coefficient of the target echoes is over 90%, and the suppression degree of jamming and noise is larger than 10dB. Thanks to the high precision measurement, the algorithm has a good performance.

Keywords: Parameters Estimation Deception Jamming Suppression Filter Operator

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