论文

电子对抗环境下ADBF相控阵雷达的阵列结构优化

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摘要
ADBF相控阵雷达通常采用子阵结构。子阵结构对系统性能具有显著影响，对相控阵进行最优子阵划分具有重要的理论与应用意义。该文利用多目标进化算法(MOEA)进行子阵结构优化，使系统在主瓣干扰下具有尽可能好的抗干扰及和、差波束旁瓣抑制性能。将和波束自适应方向图的旁瓣电平、系统输出SINR及差波束的旁瓣电平作为优化目标，构造了5种目标函数。给出了MOEA子阵结构的编码方法。基于Pareto秩排序的MOEA将3032的平面阵划分为64个子阵的仿真结果表明，系统的多种性能得到了提高。

关键词　平面相控阵　多目标进化算法　自适应数字波束形成　子阵优化　主瓣干扰

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The Array Configuration Optimization of Phased Array Radar with ADBF in Electronic Countermeasure Environment

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Abstract
The phased array radar with adaptive digital beamforming usually adopts subarray configuration. Subarray configuration has obvious influence on system performance, therefore the optimal subarray division has important significance in both theoretics and applications. Based on Multi-Objective Evolutionary Algorithm(MOEA), the subarray configuration is optimized to obtain anti-jamming performance and sidelobe level of patterns of sum and difference beam in case of mainlobe jamming as good as possible. The sidelobe level of adaptive pattern of sum beam, output SINR and sidelobe level of difference beam are taken as optimized objectives, and five objective functions are constructed. The encoding for subarray configuration used in MOEA are proposed. Simulation results of that an planar array is segmented into 64 subarrays by using MOEA based on Pareto rank sorting demonstrate that, a variety of performances of system are improved at the same time.

Key words　Planar phased array　Multi-Objective Evolutionary Algorithm(MOEA) Adaptive Digital BeamForming(ADBF)　Subarray optimizing　Mainlobe jamming

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