

论文与技术报告

分布式全相参雷达的相位差跟踪技术

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摘要:

分布式全相参雷达技术要求各单元雷达同时实现发射相参和接收相参, 然而为实现发射相参, 需要对目标处各单元雷达的发射信号的相位差进行跟踪估计。结合分布式全相参雷达的工作过程, 本文提出了基于接收相参工作模式的相位差跟踪方法和基于发射相参工作模式的相位差跟踪方法, 通过理论分析可知, 前者能实现相位差的理想跟踪, 而后的相位差跟踪结果会受到系统相位同步误差的影响, 因此, 通过对系统的相参性能进行监测, 提出了分布式全相参雷达的相位差闭环跟踪技术, 最后, 通过仿真对两种相位差跟踪方法进行了验证。本文对分布式全相参雷达相位差跟踪技术的研究, 对这一新体制雷达的实现具有一定的理论指导意义。

关键词: 分布式; 接收相参; 发射相参; 相位差; 相参性能监

Tracking Technology of Phase Difference for Distributed Aperture Coherent Radar

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Abstract:

In distributed aperture coherent radar system, the signals transmitted by all base unit radars should be made to arrive at target with the same phase to achieve the coherent transmit mode. Therefore, the phase difference between any two transmitted signals at the target was needed to track, and then the estimated value was used to compensate the transmit signals to make them in phase at target. According to the working mechanism of distributed aperture coherent radar, two tracking methods of phase difference based on the coherent receive mode and the coherent transmit mode were proposed in this paper, respectively. And then we studied the two methods according to theoretical analysis. It was found that the former method could track the phase difference accurately, while the tracking accuracy of the latter method was affected by the phase synchronization error between two base units of distributed aperture coherent radar. Therefore, a closed-loop tracking technology of phase difference was proposed base on the coherence performance monitoring. At last, simulation results verified the effectiveness of the two proposed tracking methods of phase difference. The research on tracking technology of phase difference for distributed aperture coherent radar is helpful to realize the new radar system.

Keywords: distributed aperture coherent radar coherent receive mode coherent transmit mode phase difference coherence performance monitoring

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