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## 空域滤波器组对雷达阵列合成距离像的影响分析

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## Impact Analysis of Synthetic Range Profile on Radar Array Using Spatial Filter Bank

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摘要

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摘要 为了简化雷达系统硬件设计和降低成本,可以使用多个窄带成分来合成宽带信号,从而获得满足实际需要的合成距离像。针对合成宽带信号和雷达阵列的特点,详细分析了结合合成宽带信号及传统空域滤波器组情况下所合成距离像的失真原因,指出合成距离像的失真由形状变形和位置平移两部分组成,且这两种失真分别由各个空域滤波器输出幅度和相位的波动所引起。同时,推导出计算对应相位和幅度失真度的理论公式,并由此给出了当合成距离像存在可接受失真时阵列的临界条件。计算机数值仿真结果验证了以上结论。

关键词: 雷达成像 阵列 合成距离像 子带 空域滤波器组

Abstract: In order to reduce the complexity of radar system's hardware design and keep costs down, a wideband signal can be synthesized by combining several individual narrow band components and then a synthetic range profile meeting the actual needs can be acquired. Combining with the characteristics of the synthetic wideband signal and radar array respectively, this paper analyzes the reason for the distortion of a synthetic range profile formed with combination of the synthetic wideband waveform and traditional spatial filter bank in detail, and points out that the distortion consists of two parts including range shift and shape deform, which are caused by the amplitude and phase fluctuation among each subband's spatial filter output, respectively. Meanwhile some corresponding theoretical formulas are put out and thus the array's critical conditions of element number obtaining acceptable distortion of synthetic range profile also are deduced. The above conclusions are testified by some numerical simulation tests.

Keywords: radar imaging array synthetic range profile subband spatial filter bank

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