

论文与技术报告

匹配滤波和去斜率脉压方法性能分析与比较

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摘要:

匹配滤波与去斜率脉压是宽带成像雷达常用的两种处理方法, 理论上具有同样的距离分辨率, 但在实际应用中由于调频非线性、幅相失真和混频器噪声等非理想因素的影响, 两者性能存在差异。本文首先介绍了两种方法的原理, 提出了对非理想因素导致的系统失真进行周期性分量和非周期性分量的分解方法, 仿真结果表明匹配滤波方法在旁瓣抑制、距离分辨率和信噪比等性能上都优于去斜率脉压方法, 通过数字滤波对幅相失真进行补偿后, 可进一步提高匹配滤波脉压方法的性能, 最后通过实测数据验证了分析方法及结论的正确性。本文结论可用于指导宽带成像雷达系统设计。

关键词: 宽带成像雷达; 匹配滤波; 去斜率脉压; 线性调频

Performance Comparison of Matched Filtering and Dechirp Pulse Compression

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Abstract:

Matched filtering and dechirp processing are the common methods in wide band imaging radar. They both obtain equal resolution in theory, but perform differently in practical application. This paper starts from the principles of the two methods, and analyzes the distortion of system by dividing it into two portions: the periodic part and the nonperiodic one. The simulation result shows that the method of matched filtering processing performs better than dechirp processing when considering sidelobe suppression and range-resolution and signal noise ratio. The performance of matched filtering is improved with compensation of amplitude and phase distortion. Analysis based on real data proves the effectiveness and efficiency of the proposed strategy of analyzing. The conclusions of this paper can be referred to in the system design of wide band imaging radar.

Keywords: wide band radar; matched filtering; dechirping; linear frequency modulation(LFM)

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