

防御电子技术

一种基于估计理论的ISAR超分辨率成像方法

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摘要:

针对逆合成孔径雷达(inverse synthetic aperture radar, ISAR)成像中给定合成孔径长度下方方位向匹配滤波脉冲压缩输出的主瓣分辨率随雷达至等效阵列距离变化这一难题, 基于线性系统理论, 通过目标方位向回波信号的等效建模, 提出了一种基于最小均方估计理论的超分辨率成像方法。不同于传统基于谱估计的超分辨率成像方法, 该方法利用对目标系统方位向冲击响应的估计信号进行成像, 因而能够完全消除雷达至等效阵列的距离对方方位向分辨率的影响。仿真实验验证了该方法的有效性。

关键词: 逆合成孔径雷达 高分辨成像 脉冲压缩 最小均方估计

Method of super resolution imaging for ISAR based on estimation theory

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Abstract:

Aiming at the difficult problem that the mainlobe resolution compressed by matched filtering changes with the range between equivalent array and radar when the length of the synthetic aperture is given, a new method of super resolution imaging based on least-mean-square estimation theory is proposed, which is based on the theory of linear systems and the equivalent model of target's echo signals in azimuth. Different from the traditional super resolution imaging method which is based on spectrum estimation, this one uses the estimated signal of the target's impulse response system in azimuth, and as a result it can completely eliminate the impact of the range between equivalent array and radar on the resolution in azimuth. Simulation experiment proves the effectiveness of the method.

Keywords: inverse synthetic aperture radar(ISAR) high resolution imaging pulse compression minimum mean square estimation

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