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研究论文

# MMSE准则下部分周期数据的微多普勒参数估计

左磊;李明;张晓伟

(西安电子科技大学 雷达信号处理国家重点实验室，陕西 西安 710071)

摘要：

针对信号积累时间小于目标转动周期这种情况，提出了一种基于最小均方误差(MMSE)的部分周期数据微多普勒参数估计新方法．从目标信号的时频分布中提取出其微多普勒信号，在MMSE准则下求解该微多普勒信号与正弦信号之间的误差函数，进而估计出转动目标的微多普勒参数——转速和转动半径．同时证明了该方法在提取微多普勒信号时带来的量化误差和白噪声对微多普勒参数估计精度的影响较小．仿真和实测数据的微多普勒参数估计结果，验证了该方法的有效性与精确性．

关键词： 微多普勒 最小均方误差 转速 转动半径

# Micro-Doppler parameter estimation from a fraction of the period data with the MMSE criterion

ZUO Lei;LI Ming;ZHANG Xiaowei

(National Key Lab. of Radar Signal Processing, Xidian Univ., Xi'an 710071， China)

Abstract:

The micro-Doppler characteristic of a rotation target can be represented by a sinusoid. Sometimes the integrating time is shorter than the rotation period. In this case, a new method based on the minimal mean-square error(MMSE) for estimating the micro-Doppler parameter from a fraction of the period data is proposed. The error function is constructed between sinusoid and micro-Doppler signal extracted from the time-frequency distribution of the echoes. Solving the error function in the criterion MMSE, we can obtain the rotation micro-Doppler parameters, i.e. rotation rate and rotation radius. We also prove that the discretisation error and Gaussian white noise induced by extracting the micro-Doppler signal have little effect on the accuracy of the estimated parameters. The validity and accuracy of the proposed method are evaluated via both simulation and experimental data.

Keywords: micro-Doppler minimal mean-square error(MMSE) rotation rate rotation radius

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通讯作者: 左磊

作者简介: 左磊(1984-)，男，西安电子科技大学博士研究生，E-mail: lzuo@mail.xidian.edu.cn.

作者Email: lzuo@mail.xidian.edu.cn

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