

传感器与信号处理

基于离散双正交傅里叶变换的FMCW雷达测距方法

王虹, 李兴国, 王剑桥

南京理工大学电子技术与光电技术学院, 江苏 南京 210094

摘要:

针对毫米波调频连续波 (frequency modulated continuous wave, FMCW) 雷达调制斜率的非线性带来测距误差问题, 提出采用闭环控制与双正交傅里叶变换算法相结合的方法实现高精度测距。该方法首先通过分段降频得到非线性调制FMCW的片段, 再用离散双正交傅里叶变换求出各段调制斜率, 并按时间顺序排列生成校正曲线, 最后用闭环控制进行非线性实时校正。实验结果表明, 该方法使信号的调制斜率线性度误差下降到0.27%, 测距误差降低了87%。

关键词: 调频连续波雷达 非线性校正 离散双正交傅里叶变换 调制斜率 测距精度

Ranging method of FMCW radar based on discrete biorthogonal Fourier transform

WANG Hong, LI Xing-guo, WANG Jian-qiao

School of Electronic and Optoelectronic Technology, Nanjing University of Science and Technology, Nanjing 210094, China

Abstract:

According to the problem of ranging error of the frequency modulated continuous wave (FMCW) radar is mainly from nonlinear modulate slope, a ranging method combining discrete bi-orthogonal Fourier transform (DBFT) algorithm with close-loop control circuits is proposed to realize high accuracy ranging. The method first obtains the segment of the nonlinear FMCW radar by segmentation lower frequency, then analyzes the modulated slope by DBFT, and chronologically creates correction curve, finally real time corrects the nonlinearity by closed loop control. The result shows that the modulation slope linearity error is down to 0.27%, and the ranging error reduced by 87%.

Keywords: frequency modulated continuous wave (FMCW) radar nonlinear correction discrete bi-orthogonal Fourier transform modulate slope ranging accuracy

收稿日期 修回日期 网络版发布日期

DOI: 10.3969/j.issn.1001-506X.2012.07.13

基金项目:

通讯作者:

作者简介:

作者Email:

参考文献:

本刊中的类似文章

1. 肖慧¹, 胡卫东², 郁文贤².LFMCW雷达多目标距离-速度联合配对法[J]. 系统工程与电子技术, 2010,32(1): 72-76

Copyright by 系统工程与电子技术

扩展功能

本文信息

▶ Supporting info

▶ PDF(1456KB)

▶ [HTML全文]

▶ 参考文献[PDF]

▶ 参考文献

服务与反馈

▶ 把本文推荐给朋友

▶ 加入我的书架

▶ 加入引用管理器

▶ 引用本文

▶ Email Alert

▶ 文章反馈

▶ 浏览反馈信息

本文关键词相关文章

▶ 调频连续波雷达

▶ 非线性校正

▶ 离散双正交傅里叶变换

▶ 调制斜率

▶ 测距精度

本文作者相关文章

PubMed