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论文

基于相位噪声分析的交通信息采集雷达设计

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摘要
为了满足智能交通领域(ITS)信息采集需要，该文设计了一种K波段双模式交通信息采集雷达，其两个工作模式为调频连续波(FMCW)和单频连续波(CW)模式。由于对压控振荡器(VCO)直接作为CW测速雷达的振荡源的研究较少，所以该文对在单频连续波(CW)模式下VCO的相位噪声以及雷达作用距离对测速误差的影响进行分析。此外该文还通过测速对比实验，得出在短距离应用条件下，虽然以MMIC VCO为振荡源的双模雷达的测速精度不如以低相位噪声锁相环振荡器(PLL)为振荡源的单一CW雷达，但两者相差很小。通过分析和实验可以得出，相位噪声对速度误差的影响会随着作用距离的缩短而减小。该双模雷达工作在CW模式并进行短距离测速时，能满足一般民用交通雷达测速精度的要求。

关键词 双模式雷达 相位噪声 测速误差 压控振荡器

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Traffic Information Radar Design Based on Phase Noise Analysis

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Abstract
In order to meet the needs of traffic information collection in Intelligent Transportation System (ITS), a design of K-band dual mode traffic information collection radar which can work in both Frequency Modulate Continual Wave (FMCW) mode and Continual Wave (CW) mode is introduced in this paper. As research about Voltage Controlled Oscillator (VCO) used as the oscillator in CW radar for velocity measurement is seldom reported, the effect of phase noise and detecting distance on velocity error in CW mode is analyzed. In addition, the short-range velocity measurement is also introduced. The experiment result shows that the velocity error of the dual mode traffic information radar with MMIC VCO is acceptable, although not as good as of the CW radar with low phase noise PLL. The analysis shows that the effect of phase noise on velocity error can be reduced by shortening the detecting distance. The dual mode radar is acceptable in velocity measurement of civilian traffic radar.

Key words Dual mode radar Phase noise Velocity error Voltage Controlled Oscillator(VCO)

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