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两根分布式接收天线载波频偏的联合估计

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Joint Estimation of Carrier Frequency Offsets Using Two Distributed Receive Antennas

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摘要 该文在平坦瑞利衰落信道下，针对一根发射天线、两根分布式接收天线场景，提出了一种缩小频率搜索范围的最大似然准则载波频偏联合估计方法。该方法利用载波频率、收发天线晶振精度和移动台最大运动速度的先验信息，确定了两个载波频偏之差的取值区间；联合各接收天线的相关值滑动此取值区间进行搜索，相比已有方法缩小了搜索范围。仿真结果表明，在信噪比为5 dB，载波频率为2 GHz，发射天线晶振精度为10 ppm，接收天线晶振精度为1 ppm，移动台最大运动速度为120 km/h的条件下，载波频偏联合估计的均方误差性能高出已有方法一个数量级。

关键词：　分布式天线　联合估计　载波频偏

Abstract： A new technique of joint estimation of Carrier Frequency Offsets (CFOs) is proposed based on maximum-likelihood estimation using two distributed receive antennas helping for each other for flat-fading Rayleigh channels. By utilizing the prior information of the carrier frequency, the oscillators' accuracy of transceiver antennas and the maximum speed of mobile station, the range of the difference of two CFOs is determined. Taking advantage of this result, when joint searching correlation outputs from two distributed receive antennas, the frequency searching range can be reduced compared with existing methods. Simulation results show that when the Signal-to-Noise Ratio (SNR) is 5 dB, the Mean-Square Error (MSE) performance of joint CFOs estimation outweighs existing algorithms by more than one order of magnitude on condition that the carrier frequency is 2 GHz, the oscillator's accuracy of transmit antenna is 10 ppm, the oscillators' accuracy of distributed receive antennas is 1 ppm and the maximum mobile speed is 120 km/h.

Keywords： Distributed antennas   Joint estimation   Carrier Frequency Offsets (CFOs)

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