时差定位系统的缩比实验原理分析

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摘　要：

推导了无源时差定位系统真实场景与几何缩比模型下定位误差的几何相似性和时差测量精度相似性关系，分析了信号带宽、积累时间、发射功率与矩形谱信号时差测量误差之间的缩比关系，讨论了忽略系统固有误差时，带宽、积累时间、发射功率与定位精度的缩比关系。研究结果表明，当系统固有误差可以忽略，目标辐射源的信号参数不发生变化时，在几何缩比模型中，定位误差将同比缩小，相对误差保持不变；当时差测量精度不变时，绝对定位误差不变，相对误差同比增大。实验结果验证了上述结论。

关键词：无源定位；时差定位；缩比实验；相似分析；克拉美罗下界

Principle Analysis of Scale Experiment for Time Difference of Arrival Location System

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Abstract:

The scale similarity describing the geometry and TDOA measurement precision between real scenes and geometric scale model of passive TDOA location system are derived. The scale relationship between the bandwidth, the accumulated time, the transmit power and the TDOA measurement precision of signal with rectangle-shaped spectrum is analyzed. And the scale relationship between the bandwidth, the accumulated time, the transmit power and the location precision is discussed, with ignoring the inherent system error. The results show that, in the geometric scale model, the location errors will be reduced on the same scale, the relative error remains unchanged, when the inherent system error can be ignored; and the location errors remains the same, the relative error is in the same proportion as geometric scale factor, when the TDOA measurement precision keeps unchangeably. The experimental results verify the above conclusions.

Keywords: Passive Location, Time Difference of Arrival Location, Scale Experiment, Similarity Analysis, Cramer-Rao Lower Bound

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