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有限空间液态场中基于优化EKF的双曲面水声定位方法研究

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摘　要：

针对有限空间液态场中多途干扰导致声源定位方法性能下降问题，提出一种基于扩展卡尔曼滤波（EKF）的双曲面定位方法，将基于Chan方法的双曲面定位估计结果作为EKF状态方程的初始值，然后利用定位结果对本次测量进行修正，实现基于预测误差的优化EKF算法。通过仿真和实验对本文提出的方法与常用的Chan方法进行了比较，结果表明本文提出的方法在定位准确性和定位鲁棒性方面优于Chan方法。

关键词：水声；有限空间；双曲面定位；TDOA；EKF

Research on Optimal EKF based Hyperboloid Positioning Method in Confined Underwater Space

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Abstract:

The performance of acoustic source positioning is affected by multipath interference in confined underwater space. An optimal EKF based hyperboloid positioning method was proposed to improve the accuracy and robustness of positioning in confined underwater space, which combines the geometrical and statistical approach. The hyperboloid positioning result based on Chan method was used as the initial estimate of EKF state equation. The positioning result was used to adjust the measurements and the optimal EKF was realized by predicative error. Results obtained by the proposed method were compared with Chan method by simulations and experiments. The results show that the accuracy and robustness of the proposed positioning method in confined underwater space outperformed Chan method.

Keywords: Underwater acoustic; Confined underwater space; Hyperboloid positioning; TDOA; EKF

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