基于加权最小平方法的 DV-Hop 改进算法

李长庚，刘孟思，孙克辉

（中南大学 物理与电子学院，湖南 长沙 410012）

摘　要：DV-Hop算法作为无线传感器网络定位中的经典算法，具有成本低、易于实现的优势，但是在定位精度方面存在一定的不足．改进算法对利用三边法或极大似然估计法得到未知节点位置信息的第三步进行改进．在求解方程组时采取平方后再相减的策略，同时为了减小多跳产生的定位误差，将跳数作为加权值，并为其设计相应的加权矩阵，采用加权最小平方法求解方程组，最后，利用求解方程组时得到的冗余信息对未知节点的位置进行进一步的修正．通过理论分析和实验仿真，证明改进算法提高了定位精度，减小了定位误差，可更好地应用于实际场景．

关键词：定位；DV-Hop 算法；加权最小平方法；冗余信息

Improved DV-Hop Localization Algorithm Based on the Weighted Least Square Method

LI Chang-geng，LIU Meng-si，SUN Ke-hui

（School of Physics and Electronics，Central South University，Changsha 410012，China）

Abstract：DV-Hop algorithm is one of the classical localization algorithms in wireless sensor networks. It has a low cost and is easily implemented，but its precision is low. Based on the trilateral method or the maximum likelihood estimation method，the third step which is used to obtain the location of the unknown node is corrected. Subtraction after square is adopted when we solve the equation set in the third step. To improve the localization error due to more than one hop，we set the hop count as the weighted value，and then the resulting weighted matrix is designed. With the weighted least square method introduced，the location of unknown nodes is refined with the extraneous information obtained by solving the equations. The theoretical analysis and simulation results show that the improved method can effectively improve the positioning accuracy，and can also be applied in the actual scene.

Key words：localization；DV-Hop algorithm；weighted least square method；extraneous information

作者简介：

李长庚　男，(1970-)，博士，教授．研究为无线传感器网络．

刘孟思(通讯作者)　女，(1990-)，硕士研究生．研究为无线传感器网络定位．E-mail：761242689@qq.com．