

六自由度电磁跟踪系统远场模型的修正

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摘要:

为了扩大六自由度电磁跟踪系统的应用范围, 实现远距离精确跟踪定位, 对系统原近场定位模型进行修正, 在磁偶极子远场表达式的基础上, 建立电磁跟踪系统的远场修正模型。在远场修正模型基础上, 采用基于最大单位指向矢分量的跟踪算法计算目标的位置参数()。为了解决位置变换矩阵不可逆的问题, 引入四元数法求解系统的姿态变换矩阵, 进而结合跟踪算法求解姿态参数()。数值模拟结果表明了该修正模型能够显著提高系统远距离跟踪定位的精度, 参数求解算法快速准确。

关键词: 电磁跟踪; 远场修正; 四元数; 跟踪算法

Modification of Far-field Model of Six-Freedom-Degree Electromagnetic Tracking System

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Abstract:

To enlarge the application of six-freedom-degree electromagnetic tracking system and realize long distance track, a modified far-field model of electromagnetic tracking system was proposed. This model was based on the magnetic dipole far-field expressions. The tracking arithmetic based on the maximal ponderance of unit pointing vector was introduced to calculate the position parameters. Apply the quaternion theory to calculate the attitude transformation matrix, which solved the problem that inverse of position transformation matrix can't be calculated directly. Then, combining with the tracking arithmetic, the attitude parameters could be calculated by the attitude transformation matrix. Numerical results indicate that the modified far-field model can improve the precision of the system in long distance tracking and positioning. The parameters calculation arithmetic is efficient and correct.

Keywords: electromagnetic tracking; far-field modification; quaternion; tracking arithmetic

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