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现代应用光学

基于正弦波磁光调制的空间方位失调角传递技术的改进

杨志勇, 周召发, 张志利

第二炮兵工程学院 兵器发射理论与技术国家重点学科实验室, 陕西 西安 710025

摘要： 为了扩大基于正弦波磁光调制的方位传递系统的传递范围并提高传递精度,对传统的方位失调角传递方法进行了改进。在分析当前方位失调角传递原理的基础上,引入二倍角公式来扩大失调角的传递范围;通过分析失调角与磁光调制后光强信号中横坐标不变的极值点的关系,建立了失调角测量模型,并利用信号中极值点的对比细化了测量模型。提出了大角度查表和小角度近似逼近的方法,解决了测量模型中反正切函数的具体实现问题。仿真结果表明:失调角的理论传递范围明显扩大,精度较高;实验结果表明:实际的失调角可在-64~64° 传递,传递误差在10"以内,优于当前方法。提出的方法可为大范围、高精度传递空间方位失调角提供参考。

关键词： 方位传递 空间失调角 二倍角公式 磁光调制

Improvement of transmitting spatial azimuth based on sine wave magneto-optic modulation

YANG Zhi-yong, ZHOU Zhao-fa, ZHANG Zhi-li

State Key Discipline Laboratory of Armament Launch Theory and Technology, the Second Artillery Engineering College, Xi'an 710025, China

Abstract: To enlarge the transmission scale and improve the transmission precision of an azimuth transmission system based on sine wave magneto-optic modulation, a new method of transmitting the azimuth in a large-scale and high-precision was established. The principle of the current azimuth transmission system was analyzed, and a double-angle formula was introduced to enlarge the transmission scale. A model to measure the azimuth was established according to analyzing the relationship between the azimuth and the extremum of the modulated light, and the measurement model was expatiated by comparing the extremums. A integrated method combined the approximation in little-scale with the looking-up table in large-scale was presented to calculate the arc tangent function in the model. Simulation results indicate that the theoretic transmission scale is widened obviously and the precision is improved. Experiment results show that the actual transmission scale is -64-64° and the transmission error is under 10″, which is better than those of the current methods. The method provides a new way to transmit the spatial azimuth in large-scales and high-precision.

Keywords: azimuth transmission spatial azimuth double-angle formula magneto-optic modulation

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通讯作者: 杨志勇 (1983-),男,河北保定人,博士研究生,2006年、2009年于第二炮兵工程学院分别获得学士、硕士学位,主要从事定位定向与基准传递方面的研究。E-mail:yangzhiyong121@126.com

作者简介:

作者Email:

参考文献:

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