原子能科学技术 2008 42 (9): 833-836 ISSN: 1000-6931 CN: 11-2044/TL

技术及应用

激光靶丸全表面检测与功率谱特征评价

赵学森[1]，孙涛[1]，马小军[2]，高党忠[2]，唐永建[2]，董申[1]

1.哈尔滨工业大学 精密工程研究所，黑龙江 哈尔滨150001
2.中国工程物理研究院 激光聚变研究中心，四川 绵阳621900

收稿日期 2007-11-1 修回日期 2007-11-10 网络版发布日期: 2008-9-25

摘要 本工作基于靶丸全球面测量的经纬迹线法，应用由原子力显微镜、精密回转气浮轴系及辅助转位轴系等组成的靶丸表面形貌测量系统，对直径0.34 mm的空心塑料靶丸表面进行了测量实验。实验选择了圆周9条经圆(间隔20°)，每个经圆方向上纬圆间隔10 μm，最大偏移20 μm的方案，获取了靶丸全球面的经纬测量迹线，并对测量结果进行了模数-功率谱特征曲线和表面均方根粗糙度的分析。

关键词 激光聚变靶丸 原子力显微镜 全表面检测 经纬迹线法 功率谱
分类号 TL627

Complete Surface Measurement and Power Spectrum Evaluation of Inertial Confinement Fusion Target

ZHAO Xue-sen[1], SUN Tao[1], MA Xiao-jun[2], GAO Dang-zhong[2], TANG Yong-jian[2], DONG Shen[1]

1. Center for Precision Engineering, Harbin Institute of Technology, P. O. Box 413, Harbin 150001, China; 2. Research Center of Laser Fusion, China Academy of Engineering Physics, P. O. Box 919-986, Mianyang 621900, China

Abstract Based on the longitude-latitude trace method, a measurement system was developed for the complete surface measurement of inertial confinement fusion target. It was consisted of reconstructed atomic force microscope (AFM) combined with the precision rotating air-bearing and assistant transform shaft. In order to measure a hollow CH target with diameter of 0.34 mm, a complete coverage pattern was arranged to be latitude traces with 10 μm separation along nine longitude paths separated by 20° (maximal offset of the latitude is 20 μm). All of traces along the whole spherical surface were obtained experimentally. The sphere surface power spectrum versus mode number curve and the root mean square roughness (RMS) parameter were also calculated to evaluate the target characteristics.

Key words inertial confinement fusion target _ atomic force microscope _ complete surface measurement _ longitude-latitude trace method _ power spectrum

DOI

通讯作者