

激光技术

热损失对连续波高能激光能量测试结果影响的研究

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收稿日期 2006-7-10 修回日期 2006-7-30 网络版发布日期 2006-11-15 接受日期

摘要 因激光照射时间可达30s,故用量热法测量连续波高能激光能量时,传统热损失影响下得到的激光能量和实际激光能量之间存在着较大的差距。为此,以量热式锥形吸收腔高能激光能量计为实验模型,从理论上分析了热辐射、热传导及热对流对连续波高能激光能量测量的影响,得出锥形吸收腔时间-温度关系曲线的数学模型,并通过实验验证了该数学模型的正确性,建立了相应的试验装置。用该数学模型对测量结果进行了最小二乘法拟合,所得拟合曲线和实际曲线非常吻合。通过该数据处理模型对测量结果加以修正,可使测量不确定度达到1%以内

关键词 [连续波高能激光](#) [量热式激光能量计](#) [热损失](#) [锥形吸收腔](#)

分类号 [TN247](#) [TB96-34](#)

Study on effect of heat loss on energy measurement result of CW high energy laser

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Abstract The energy measurement result of CW high energy laser, acquired by the calorimetric method and traditional data processing method, is influenced greatly by the heat loss as the laser pulse duration can be up to 30s. The effect of heat loss (including heat radiation, thermal conduction and heat transfer) on energy measurement result of CW high energy laser is studied in this paper. An experiment setup and the mathematical model of time-temperature relation were built up, and the correctness of the mathematical model were verified by experiments. The temperature rising curve of the taper energy absorbing cavity according to the relative expression with a corresponding data processing model has been gained. Based on the mathematical model, the measurement result is fitted with the least square method and the fitted curve tallies with the practical curve quite well. The measurement result was corrected by the data processing model. The energy measurement result shows that the measurement uncertainty is within 1%.

Key words [CW high energy laser](#) [calorimetric energy meter](#) [heat loss](#) [taper energy absorbing cavity](#)

DOI:

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