
脉冲激光能量的非接触测量方法研究

摘 要

简单的介绍了部分实验原理，其中主要包括了脉冲激光产生冲击波和激光诱导击穿光谱等的原理，并在脉冲能量范围为 47mj~196mj 中，利用脉冲激光击穿空气产生声波，检测声波的最大振幅，期间一共测量了 16 组数据，每组数据下都有四次以上的测量的记录，整个实验数据都是普通的实验室中进行的，并求得各组数据的平均值，并将最大振幅的平均值求出其平方值，然后用 origin 软件分别对最大振幅与激光能量和最大振幅的平方与激光能量进行图像处理，对最大振幅与激光能量的关系图进行二次曲线拟合，拟合系数为 0.99233，对最大振幅的平方与激光能量的关系图进行线性拟合，拟合系数为 0.96946。经过实验，最终能够提出了使用非接触的测量脉冲激光能量的一种方法，而且研究得出，在室温条件下，实验室里的脉冲激光能量与脉冲激光产生声波的能量成正比的结论，同时在实验中，注意到该实验的不足之处，即还并不能够深入的求出两者之间的比值，但根据现有条件判断出应该与实验室中空气等各项指数有关。

关键词：非接触测量；脉冲激光能量；声波测量；激光诱导击穿光谱

Research on Non -contact Measurement of Pulse Laser Energy

abstract

Part simply introduces the experimental principle, mainly including the pulse laser to produce shock waves and the principle of laser induced breakdown spectroscopy, etc, and the scope of pulse energy of 47 mj ~ 196 mj, using pulse laser breakdown air produce sound waves, detecting the maximum amplitude of sound wave, total measurement during the 16 sets of data, each group of more than four times of measurement under the data record, the experimental data are common in the laboratory, and the average of the data, and will find out the maximum amplitude of the average square values, Then origin software was used to process the images of the maximum amplitude and laser energy and the square and laser energy of the maximum amplitude respectively. The conic curve fitting was carried out for the relation diagram of the maximum amplitude and laser energy with the fitting coefficient of 0.99233, and the linear fitting was carried out for the relation diagram of the maximum amplitude and laser energy with the fitting coefficient of 0.96946. After the experiment, finally to put forward the use of non-contact measurement of pulse laser energy of a kind of method, and studies, at room temperature, the pulse energy and pulse laser in lab acoustic energy is proportional to the conclusion that in the experiment at the same time, notice that the deficiency of the experiment, is also not to further find out the ratio between the two, but according to the existing conditions determine should be related to the laboratory and the parameters of the air.

Key words: non-contact measurement; pulsed laser energy; acoustic measurement; LIBS

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