激光技术

# 激光光束质量参数测量方法的研究

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摘要　　针对激光器的重要技术指标——激光光束质量(包括光束模式、质心、光束束宽及光束发散角等参量）对激光器使用效果的影响，介绍了激光器光束质量检测仪的工作原理及目前较为常用的测量束宽的2种方法：二阶矩法和刀口法。用这2种方法对小功率激光器的光束质量进行测量，二阶矩法测得的最大束宽平均值为2.55E+03μm，最小束宽平均值为1.50E+03μm，最大发散角平均值为2.13mrad，最小发散角平均值为1.25 mrad。刀口法测得的最大束宽平均值为2.43E+03μm，最小束宽平均值为1.48 E+03μm，最大发散角平均值为2.03mrad，最小发散角平均值为1.24mrad。二阶矩法测得光斑质心变化量x方向为0.03mm，y方向为0.01mm，刀口法测得光斑质心变化量x方向为0.02mm，y方向为0.00mm。这些数据说明光斑质心变化量很小。因M2因子值为2.53大于1，说明激光不是理想高斯基模。

关键词　　二阶矩法　刀口法　光束质量　光斑质心　光斑束宽　发散角
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# Study on measurement method of laser beam quality parameter

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**Abstract** Laser beam quality is an important technical specification, which consists of parameters of beam mode, centroid, beam width and beam divergence angle and etc. The working principle of laser beam quality analyzer and two methods (second　order quadrature and knife　edge method) for beam width measurement common used nowdays are presented. The beam quality of low level laser was measured with the two methods. The maximum and minimum width average values are 2.55E+0.3μm and 1.50E+03μm, the maximum and minimum divergences are 2.13mrad and 1.25mrad measured by the second　order quadratare method; the maximum and minimum width average values are 2.43E+03μm and 1.48E+03μm, the maximum and minimum divergence are 2.03mrad and 1.24mrad measured by knife　edge method.The variation of centroid at x and y directions are 0.03mm and 0.01mm measured by the second　order quadrature method,and the variation of centroid at x and y direction are 0.02mm and 0.00mm measured by knife　edge method.The results show that the variation of the light spot centroid is ver small.The value of M2factor is 2.53, larger than 1, not Gauss so laser bean is idea fundamental mode.

**Key words** second　order quadrature method　kinfe　edge method　beam quality　light spot centroid light spot beam width　divergence angle

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