

单纵模 He-Ne 激光器的研究

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摘要: 分析了外腔式 He-Ne 激光器的输出特性。调节声光锁模调制器可得到实现锁模的调制器的频率 $\nu=45.589\text{MHz}$, 从这个频率 ν 可以计算出激光的实际光程为 1645.134mm 。然后在激光器腔内插入法布里-珀罗标准具(简称 F-P 标准具), 由于模竞争的效应, 使其他的模在激光产生的瞬间就被抑制, 从而获得单频的振荡。计算出 F-P 标准具的倾斜角应大于 1.555° 。输出的单纵模激光的波长是 632.8nm , 功率为 1.9mw , 发散角为 0.124mrad 。

关键词: 单纵模; He-Ne 激光器; F-P 标准具; 模式选择; 声光调制器

The research of the Single Frequency He-Ne Laser

Abstract: Experimental studies on single frequency He-Ne laser were made. A mode-locked He-Ne laser was achieved by adjusting the acousto-optic modulator with the modulating frequency of 45.589MHz . Based on this value, we calculated the actual optical path of the laser being 1645.134mm . Then by inserting a Fabry - Perot interferometer(FPI) into the external He-Ne laser, a single frequency was obtained with all other modes suppressed because of mode competition. Calculated slant angle of the FPI must be bigger than 1.555° . The wavelength of the single-frequency laser is 632.8nm , its output power is 1.9mW and the angle of divergence is 0.124mrad .

Key Words: Single-longitudinal mode; He-Ne laser; Fabry - Perot interferometer; Mode selection; Acousto-optic modulator

教师点评: 论文主要对单纵模 He-Ne 激光器和锁模 He-Ne 激光器进行了实验研究。论文首先介绍了 He-Ne 激光器的工作原理、纵模选择的方法与原理和声光锁模原理, 并在实验中利用 F-P 标准具实现了单纵模 He-Ne 激光输出, 利用声光调制器实现了锁模 He-Ne 激光输出。实验内容丰富, 工作量饱满。论文内容安排合理, 写作规范, 是一篇优秀的学士论文。