

Study of the Optimum Operating Gas Pressure of the Optically Pumped FIR Laser

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Abstract

The optimum operating gas pressure of the OPFIRL was studied theoretically and experimentally. The density matrix equation of 3-level quantum system was solved and the output FIR power density of OPFIRL was calculated by using the iteration method. The output FIR power density was a function of pumping power density I_p , pumping frequency detuning x , FIR signal frequency detuning y , operating gas pressure. The calculated optimum operating gas pressure of the OPFIRL was in good agreement with the experimental results. The correlations between the optimum operating gas pressure and other parameters such as pumping power density, the length of sample tube were clarified.

Keywords submillimeter waves, optically pumped submillimeter lasers

· 简讯 ·

多波长He—Ne激光器研制成功

理论上已经证明, 在He的 $3S_2 \rightarrow 2S_{1-10}$ 能级跃迁中, 除了 $3S_2 \rightarrow 2P_0$ 是禁戒跃迁外, 其余9条谱线都能产生激光振荡, 但是在这些可供实用的可见区 He—Ne 激光谱线, 上能级全部处于竞争状态, 因此, 随着可见区内跃迁几率最高的 633nm 谱线产生振荡, 会使其余谱线受激振荡受到抑制, 因而难以产生激光。对于543nm 绿光的产生尤其困难。

近几年来, 国内外不少研究工作者和厂家正致力于多波长He—Ne 激光器的研制。最近, 我校激光与光谱学研究所在一台有效增益区为1.1m的He—Ne激光装置中, 用宽带激光反射镜与波长选择棱镜构成谐振腔, 棱镜配置在谐振腔内, 波长选择是通过把棱镜或激光反射镜相对于光轴旋转的方法来实现的。在作实验的He—Ne 激光管中, 分别获得543 nm, 594nm, 604nm, 612nm, 633nm等5条谱线的单波长形式的独立振荡。

(源永安)

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