Coupling losses of modes in rectangular waveguide laser resonator

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We use the method developed earlier by Abrams and Henderson to deal with coupling losses of modes in rectangular waveguide laser resonator. Coupling loss of EH_{11} mode on wavefront matching mirror and flat mirror have been calculated quantitatively. Then this method has been generalized to analyze self-coupling of higher order modes and cross-coupling of several modes. The diffraction loss due to definite aperture of mirrors has been discussed. On the basis of these calculations the transverse mode discrimination of rectangular waveguide laser resonaror has been analysed systematically, and insights into the condition for EH_{11} single mode operation and the condition for the diffraction loss being negligible have been attained.

The results of these calculations may be used to help in the design of waverguide laser resonators.

方形波导激光器的模式耦合损耗

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本文应用 Abrams 和Henderson 分析波导激光器的耦合损耗的一个方法，定量计算了方形孔径波导激光器中 EH_{11} 模在匹配反射镜及平面镜上的耦合损耗。进而将该方法加以推广，用来计算各较高阶波导模的自耦合及各模式之间的交叉耦合；分析了由腔镜的有限孔径所带来的 EH_{11} 模的附加衍射损耗。得出了有关曲线和近似计算公式。在此基础上对波导激光器的横模鉴别进行了系统的分析，对实现 EH_{11} 模单模运转的条件及反射镜的衍射损耗可以忽略的条件获得了深入的认识。

本文的计算结果可能对波导激光器的设计有所帮助。