光子学报 2011, **40**(8) 1149-1153 **DOI**: 10.3788/gzxb20114008.1149 **ISSN**: 1004-4213 **CN**: 61-1235/O4

论文

共线型声光可调谐滤波器非互易效应研究

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摘要:

通过创建超声频率与衍射效率的动态方程,分析了声光器件在不同射频驱动频率下衍射效率的分布情况,并给出相应表达式.提出了在100 MHz射频处也存在与高于1 GHz处类似非互易现象.进一步通过比例系数δF/ΔF的引入,在此基础上分别利用波长532 nm和632.8 nm激光器,在二氧化碲晶体中进行非互易效应实验.实验得到传输带宽改变达到总衍射带宽的50%～60%,与理论计算值基本吻合.研究结果表明,实际中可将非互易效应大规模应用于包括定向耦合器（光路由器）在内的光电器件的开发.

关键词: 声光可调谐滤波器 声光衍射 非互易效应

Non-reciprocity of Collinear Acousto-optic Tunable Filter

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Abstract:

Dynamic formulas of acoustic frequency and diffraction efficiency are proposed.Distributions of diffraction efficiency of the acousto-optic cell at different driving frequencies are analyzed,and its approximate expression is also given.However,it is found that the non-reciprocal effect also appears at low frequency (e.g.100 MHz),which usually occurs at above 1 GHz frequency.Through introducing scale factor δF/ΔF,the non-reciprocal effect experiment is carried out with the laser wavelengths of 532 nm and 632.8 nm in Tellurium dioxide crystals.The obtained results show that the total change in the diffraction bandwidth is 50% to 60%,which basically matches the calculated result.According to this result,the non-reciprocal effect can be applied in the development of directional couplers (optical router) and other optoelectronic devices.

Keywords: Acousto-Optic Tunable Filter(AOTF) Acoustic-optical diffraction Non-reciprocal effect

收稿日期 2011-05-06 **修回日期** 2011-06-17 **网络版发布日期** 2011-08-25

DOI: 10.3788/gzxb20114008.1149

基金项目:

国家高技术研究发展计划（No.2006AA12Z144）资助

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