

论文

偏振和衍射双重效应影响的Schmidt棱镜特性

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摘要:

一束偏振光经过Schmidt棱镜的两个不同路径,成为两个不同的偏振状态,使得出射光束的偏振态呈现非均匀分布.为了探索偏振态非均匀分布对Schmidt棱镜传光质量的影响机理,将两个路径对应的光波函数引入屋脊衍射积分方程,得到了偏振效应影响的屋脊衍射场强分布.场强分布的数字计算表明:在偏振效应和衍射效应的双重影响下,经Schmidt棱镜出射的光场分布出现了严重变形;对应同一入射线偏振光出现的P、S两分量位相差的差异,使得P、S分量的屋脊衍射光强分布 I_P 、 I_S 有很大差异,这种差异在入射线偏振光方位角为 0° 和 90° 时达到最大;而合光波的衍射光强 I_P+I_S 是分裂为有一定空间间距的多峰分布,但多峰分布随入射线偏振光方位角的变化比较小.实验拍摄了He-Ne激光经Schmidt棱镜衍射后出射光强分布图.实验结果和理论分析一致性表明:Schmidt棱镜中的偏振效应和屋脊衍射效应导致了一束入射线偏振光分裂为有一定空间间距的多峰光束,严重破坏了Schmidt棱镜的传光特性.

关键词: Schmidt棱镜 屋脊衍射 偏振效应 偏振像差

Characteristics of Schmidt Prism Under the Effect of Polarization and Diffraction of Ridge

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Abstract:

The polarization effect of Schmidt prism caused the two different polarization states in one beam. The field intensity distribution of diffraction of the ridge with the effect of polarization can be obtained in the way of introducing the integral equation of diffraction of ridge. It is shown that the optical field distribution distorted severely under the effect of polarization and diffraction passing through the Schmidt prism. The influence discipline of the result of diffraction with the variational azimuth of the incidence light is analyzed in detail. In the experiment, the diffraction patterns of two peaks are splited by the diffraction of zero order with the light beam emitting from a He-Ne laser passing through the Schmidt prism. The polarization effect and the diffraction of ridge have destroyed severely the light transmit both in the analysis of experiment and the theory.

Keywords: Schmidt prism Diffraction of ridge Polarization effect Polarization aberration

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