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论文

石英晶体温度效应对四频差动激光陀螺中光场偏振特性的影响

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摘要：

为研究石英晶体温度效应对四频差动激光陀螺的影响，从陀螺的自再现传播矩阵出发，结合石英晶体旋光率随温度变化的经验公式，利用琼斯矩阵求本征模的方法，得出了四频差动激光陀螺腔内光场本征偏振态与温度的关系并进行了数值分析，得到椭圆度和左右旋差损随温度变化的曲线。结果表明，石英晶体温度效应对偏振特性的影响与反射镜片的振幅反射率和反射相移有密切关系，对于典型陀螺参量，在-60℃～60℃范围内石英晶体温度效应导致左右旋差损从0增加至10-6量级，椭圆度从0.122增至0.138。

关键词：　激光光学;四频差动激光陀螺;石英晶体;温度效应

Influence of quartz crystal temperature effect on optical polarization characteristics of four-frequency differential laser gyro

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Abstract:

Proceeding from the propagating Jones matrix of laser, the relation between the eigenpolarization and the temperature in the four-frequency differential laser gyro was obtained in combination with the empirical formula of quartz crystal rotatory power versus temperature and the method of calculating eigenvectors, for the research on the influence of the quartz crystal temperature effect on the four-frequency differential laser gyro. The variation curves of the light ellipticity and the differential loss with the temperature were acquired by the numerical analysis. The result shows that the influence of quartz crystal temperature effect on the optical polarization characteristics is closely related to the amplitude reflectivity and the phase shift of the mirror. For typical gyro parameters, the differential loss and the ellipticity increase respectively from 0 to 10-6 and from 0.122 to 0.138 when the quartz crystal temperature is in the range of -60℃ to 60℃.

Keywords: laser optics; four   frequency differential laser gyro; quartz crystal; temperature effect

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