

理论研究

五角棱镜的光束转向误差对波前测量的影响

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摘要 从分析五角棱镜的角度制造误差产生的光学平行差入手, 推导出确定入射光线和棱镜调整的表达式; 利用棱镜转动定理建立了五角棱镜的光输出平面波前与其角度制造误差和导轨引起的运动误差之间的关系; 并用计算机模拟试验分析了五角棱镜的角度制造误差和导轨引起的运动误差产生的扫描光束转向的波前误差。指出此研究结果有利于五角棱镜的加工和棱镜调整, 还有利于大口徑望远镜波前检测过程中扫描光束转向的波前误差的修正。

关键词 五角棱镜 波前测量 角度制造误差 光学平行差 运动误差 棱镜转动定理

分类号

Influence of beam turning error of pentagonal prism on wave front measurement

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Abstract Optical parallelism errors caused by the angle errors of pentagonal prism, which is generated in manufacture process, are analyzed, and the formulae for determining incidence ray and adjusting prism are derived. The dependence of the output plane wave front of pentagonal prism on the angle errors of pentagonal prism and kinematical errors caused by guide rail is established according to the prism rotation theorem. The wave front error of scanning beam turning caused by the angle errors of pentagonal prism and the kinematical errors of guide rail was analyzed with computer simulation. This study is useful to pentagonal prism manufacture process and adjustment, and helpful to correct wave front error of scanning beam turning during wave front measurement of large aperture telescope.

Key words pentagonal prism wave front measurement angle error optical parallelism error kinematical error prism turning theorem

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