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光学计量与测试

大口径平面镜的计算机辅助瑞奇-康芒检验

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摘要：

在瑞奇-康芒检测中，被检平面本身所固有的像散和大曲率在被检系统波像差数据中都表现为像散。由于被检平面处于发散光路中,这就使得平面面形与系统波像差之间的关系(即影响函数)变得十分复杂,推导起来十分困难，只能进行定性或半定量检测。文中介绍了如何通过计算机光线追迹模拟瑞奇-康芒检验，在两个瑞奇角下得到两组影响函数，以此建立过定方程组，由干涉仪检测得到的两个不同瑞奇角下的系统波像差，通过最小二乘法解过定方程组，拟合得到被检平面镜的面形误差；实现了大口径平面镜的定量检测，并以平面镜直接检验的面形误差作为对比，检验结果的一致验证了该方法的准确性与可行性。

关键词： 光学检测 瑞奇-康芒检验 波像差 影响函数

Computer added Ritchey-Common test for large flat mirror measurement

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Abstract:

In Ritchey-Common test，the intrinsic astigmatism of the mirror plane under test and the astigmatism of the large curvature can not be distinguished in the measured system wave-front aberration. The flat is set in a divergent beam, which makes the relation between figure errors of flat and wavefront aberrations (influence function) complicate and difficult to derive. The procedure to simulate the Ritchey-Common test to derive the relationships between the figure errors of an optical flat and the wavefront aberrations, as well as the procedure to construct two set of influence functions by ray-tracing program are presented. Figure errors of the flat can be extracted from a set of over defined linear equations with the aid of least squares, using the influence functions and the measured wavefront aberrations for two different Ritchey angles. Both Ritchey-Common test and direct measurement results are presented. The comparison result proved the feasibility and reliability of this method.

Keywords: optics test Ritchey-Common test wavefront aberration influence function

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