光学设计

基于四元数方法的光学系统可视化建模与仿真

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摘要   以四元数方法在光线传输计算中的应用为理论基础，推导出一套基于四元数方法的光线传输运算公式，采用Visual C++ 和OpenGL建立一个光学系统可视化仿真平台，用于振动环境下光学系统的辅助分析。给出光线追迹运算流程与图形可视化实现关键技术，并对仿真平台的整体结构与功能进行了介绍。通过对某光学系统的仿真分析，成功仿真出图像经过光学系统产生的枕形畸变，证明四元数方法在光线传输运算中的正确性与可行性，为复杂光学系统的空间光线传输计算提供了另一种方法。

关键词   光学系统   建模与仿真   四元数   OpenGL

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Visual modeling and simulation of coaxial optic system based on quaternion method

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Abstract An experiment platform for simulation of optic systems is introduced, based on the theory of the quaternion application in the calculation of light propagation. The visual simulation platform was established with the visual C++ and OpenGL based modeling and simulating method. This platform can be used for the auxiliary analysis of optic systems in vibration environment. The function and the overall structure of the simulation platform are introduced. The computational flow of light propagation and the key techniques of visualization are presented. An optical system was employed to verify the correctness and feasibility of quaternion method in the calculation of beam propagation, and the pincushion distortion caused by the optical system was successfully simulated.

Key words   optical system   modeling and simulation   quaternion   OpenGL

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