

MOEMS微型二维扫描镜的建模与仿真

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摘 要：

微型二维扫描镜是一种基于微光机电系统（MOEMS）技术的新型偏转扫描装置，与传统扫描装置相比具有体积小、功耗低、扫描频率高等优点。给出了一种MOEMS微型二维扫描镜的设计方案，建立了二阶振动系统的动力学模型，推导了系统刚度和扫描频率的计算式，以及MOEMS微型二维扫描镜在两个方向上的最大偏转角。采用有限元方法对系统进行了模态仿真、谐响应分析和应力仿真，分析结果均符合设计要求，验证了该方案的可行性和理论模型的正确性。

关键词：微光机电系统；二维扫描镜；动力学模型；有限元

Modeling and Simulation of Two-Dimensional MOEMS Scanning Mirror

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Abstract:

Two-dimensional scanning mirror is a new kind of deflection scanning device based on micro-optical-electro-mechanical system (MOEMS) technology, which has great advantages over the conventional scanning mechanisms with small volume, low power consumption and high scanning frequency. A two-dimensional MOEMS scanning mirror is presented and the dynamic model of the two degrees of freedom (DOF) vibration system is established. Equations of stiffnesses and scanning frequencies of the system are deduced, as well as the maximum deflection angles of the two DOF. The operational modes, harmonic response and stress distribution of the system are simulated using the finite element method and the results all meet the requirement of design. It is concluded that the design and modeling of the two-dimensional MOEMS scanning mirror are correct and effective.

Keywords: MOEMS; two-dimensional scanning mirror; dynamic model; finite element

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