纳米磁悬浮二维工作台力平衡结构设计 Design of Force Balance for 2-DOF Nanopositioning Magnetic Levitation Stage

程伶俐 余晓芬

合肥工业大学

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摘 要： 为了消除附加力矩对纳米磁悬浮二维工作台平稳直线运动的影响，研究了工作台的磁力、重力及摩擦力等各种作用力。基于力平衡原理对纳米工作台进行了结构设计，得到了纳米电动机驱动力的作用方向和作用点坐标。在此基础上进行了工作台运动导轨直线度及重复性实验，结果表明，工作台的偏摆误差在5″以下，俯仰误差在15″以下，两种误差每毫米点的重复性均在1″左右，工作台运动平稳。 In order to eliminate the additional moments of force, the magnetic force, gravity force and friction force were studied in a novel two-degree-of-freedom (2-DOF) nanopositioning magnetic levitation stage. The structure of the nanopositioning stage was designed in terms of the theory of force balance, then, the direction and coordinate point of the drive force of the nanomotor were gained. The experiment of linearity and repeatability of the stage were carried out, and the experiments results indicated that the yaw error was less than 5 arcsec, the pitch error was less than 15 arcsec and the repeatability of these two errors were nearly 1 arcsec per one millimeter. The stage movement was stable.

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