

Robust Control of a Long-Stroke Precision Stage: with Applications to Fresnel Zone Plane Fabrication

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Abstract

This paper applies a combined stage for fabricating Fresnel zone plane (FZP). The combined stage integrates piezoelectric transducers (PZT) and stepper motors, to achieve precise positioning over large strokes. Because PZT-s non-linearities and system uncertainties might degrade system performance, we design robust controllers to cope with these obstacles for precision positioning. Then we integrate the stepper-motor stage for long-stroke movements. We implement the designed controllers to the combined stage, and apply it to fabricate the FZP by two photon polymerization (TPP) techniques. Last, the quality of FZP can be revealed by image tests.