

Design and Control of a Long-stroke nano-positioning stage

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Abstract

This paper demonstrates the design and control of a long-stroke nano-positioning stage that consists of a piezoelectric-transducer (PZT) stage and a stepper stage. The study was carried out by three steps. First, we independently identified and controlled these two stages by robust loop shaping techniques to achieve good robustness and performance. Second, we combined the two stages to accomplish precision positioning for a long travelling range. We developed a control structure that uses local sensors for the stepper stage and global sensors for the PZT stage. Lastly, the system was integrated for experimental verification. Based on the results, the proposed system is deemed effective in achieving high precision and fast responses over a long stroke.