# Frequency response data-based peak filter design applied to MIMO large-scale high-precision scan stage

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**Abstract:**
A large-scale high-precision scan stage is important equipment in the industrial productions of micro-fabrication such as flat panel display (FPD) lithography systems. Designing controllers for multi-input multi-output (MIMO) systems is time-consuming and needs experience because of the interaction between each axis and many controller tuning parameters. The aim of this study is to develop a peak filter design method based on frequency response data to reduce repetitive disturbance. This data-based approach does not use the model and only uses the frequency response data of the controlled system and the disturbance spectrum calculated from the scanning error data (Contribution 1). The peak filter is designed by convex optimization and satisfies robust stability conditions for six-degree-of-freedom systems (Contribution 2). The control performance of the designed peak filter is experimentally demonstrated with an industrial MIMO large-scale high-precision scan stage in reducing the scanning error of the main stroke of the translation along the $x$-axis (Contribution 3).

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