Development of 3-axis Nano Stage for High Precision Positioning System

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초정밀 위치 결정용 3축 나노 스테이지의 개발

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Key Words: 3-axis Nano Stage(3축 나노 스테이지), Positioning(위치결정), Magnetic Circuit(자기회로), Flexible Mode(유연모드), Design of Experiments(실험계획법), Dynamic Characteristics(동특성)

Abstract : The precision positioning system requires robust structural design to obtain enough bandwidth and efficient magnetic circuit to have fast access time. In this paper, the 3-axis nano stage was proposed and dynamic characteristics was improved by design of experiments (DOE) based on specifications of our precision positioning device. Finally, it was checked that the designed actuator had the proper dynamic characteristics through dynamic experiments.

초정밀 Decoupled 이중 스테이지의 설계 및 제어

최영만*(KAIST) · 김기현*(KAIST) · 김정재*(KAIST) · 권대갑*(KAIST) ·
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Design and Control of High-precision Decoupled Dual-stage

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Key Words: High precision stage (정밀 스테이지), Voice Coil Motor(보이스 코일 모터)

Abstract : This paper presents 3-axis high-precision dual-stage compatible with 300mm wafer. The proposed dual-stage system cosists of a fine stage for XYΘ motion and a coarse stage for large travel. The fine stage uses four voice coil motors and air bearings which make mechanically decouled plane motion on granite base. The coarse stage carry coil blocks which make Lorentz force against the fine stage with the range of 500mm×500mm using three linear motors. To get precise position of the fine stage, laser interferometers and plane mirrors are adopted. The proposed dual-stage has good performance in both step an scan motion control. Experimental results shows the positioning error is about 10nm and the following error in the scan motion is about 40nm.