

다공질 공기베어링의 강성 특성 연구

이성혁[†](중앙대) · 정순철^{*}(중앙대 원) · 이재응[†](중앙대) ·
 김혁^{**} · 최형길^{**} · 류제형^{**} · 이동진^{**} · 지홍규^{**}(삼성전자 메카트로닉스연구소)

A Study on Stiffness Characteristics of Porous Air Bearing

Seong Hyuk Lee, Soon Chul Jung, Jae Eung Lee, Hyuk Kim,
 Hyoung Gil Choi, Je Hyoung Ryu, Dong-Jin Lee, Hong Kyu Ji

Key Words: Porous air bearing (다공질 공기베어링), Stiffness (강성), Permeability (투과율)

Abstract : The present study investigates the static and dynamic stiffness characteristics of porous air bearing which is mainly used for ultra precision positioning machine. In this study, the static and dynamic stiffness of air bearing is measured with the accuracy of 1 μ m. The permeability of porous medium is also estimated by comparing predicted results with experimental data for the static case. Numerical analysis is conducted by using the commercial CFD code (FLUENT V6). In particular, the deforming and re-meshing technique is adopted for solving the fluid-solid interaction problem. As a result, it is found that the predictions for the static stiffness show good agreement with experimental data when the appropriate permeability value is used, and the dynamic stiffness appears to be relatively smaller than the static stiffness.

형상기억합금의 수치해석을 위한 특성실험 및 작동기 응용

최현호[†](서울대) · 김상헌^{*}(서울대) · 조맹효^{**}(서울대)

Experimental Test for Numerical Simulation of SMA Characteristics and Device Verification

Hyunho Choi, Sanghaun Kim and Maenghyo Cho

Key Words: Shape Memory Alloy(형상기억합금), Two-way Effect(양방향효과), Training Effect(트레이닝 효과), Rate Effect(시간증분효과)

Abstract : Adaptation of two-way shape memory effect of SMA wire to the actuator is examined. Therefore the SMA characteristics of training, material properties, response time at different thermal cycling rates are tested. During training, permanent deformation is accumulated till a certain number of cycle and then saturated. The amount of two-way strain is unchangeable over all cycle and the slope of strain(or stress)-temperature curve is slow as the increase of applied stress. The rate effect is observed resulted from the thermal distribution which heating profile differs from cooling as thermal cycling time. In addition, using the estimated SMA properties, an experimental test for the simple smart wing is performed.