압축력이 작용하는 유연보를 이용한 수동 제진기의 준영강성 특성

Quasi-zero-stiffness Characteristic of a Passive Isolator Using Flexures under Compression Force

김경홍* · 안형준†

Kyoung-Hong Kim, Hyeong-Joon Ahn

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ABSTRACT

This paper presents quasi-zero-stiffness (QZS) characteristic of a passive isolator using flexures under compression force. The passive isolator consists of a positive stiffness element (a vertical coil spring) and a negative stiffness element (flexures under compression force), and their proper combination of the positive and negative stiffness elements can produce both substantial static and zero dynamic stiffness, so called QZS. Firstly, a nonlinear dimensionless expression of a flexure under compression force is derived. A dynamic model of the passive isolator is developed and numerical simulations of its time and frequency response are performed. Then, undesirable nonlinear vibration is quantified using a period doubling bifurcation diagram and a Poincare's map of the isolator under forced excitation. Finally, experiments are performed to validate the QZS characteristic of the passive isolator.

† 교신저자; 숭실대학교 기계공학과
　E-mail : ahj123@ssu.ac.kr
　Tel : (02) 820-0654, Fax : (02) 820-0668
* 숭실대학교 기계공학과 대학원