

PROCEEDINGS

Research on the Modal Control Mechanism of Reinforced Structures Based on the Shape Memory Effect of SMA

Jing Zhang and Liang Meng*

School of Mechanical Engineering, Northwestern Polytechnical University, Xi'an, 710072, China

*Corresponding Author: Jing Zhang. Email: jing.zhang@mail.nwpu.edu.cn

ABSTRACT

Shape memory alloys (SMA), with their unique phase transformation capability, can deform under external force and recover their original shape through a martensite-to-austenite phase transformation triggered by heating [1]. Utilizing this characteristic, SMA wires can be pre-stretched and fixed, generating internal stress during shape recovery, which increases the natural frequency of SMA wire structures [2]. This property is of significant importance in structural dynamics design. Based on this, structures incorporating SMA wires and SMA-reinforced plate structures can be designed to dynamically adjust their natural frequencies and control structural dynamic responses. Furthermore, the vibration modes of weak-stiffness plate structures can be modified, providing a novel design approach for SMA multi-material active vibration control structures [3]. This method holds great potential for optimizing structural performance and enhancing vibration control capabilities [4].

KEYWORDS

Structural dynamics; shape memory alloys; active vibration control; prestressed structures

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