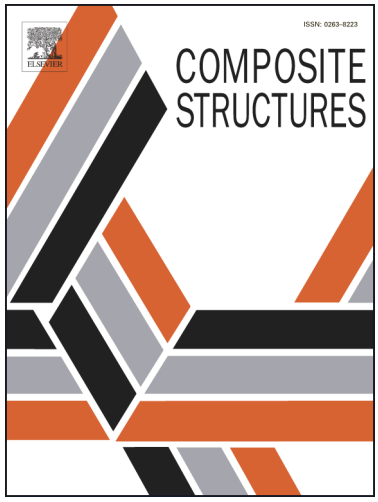

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Vibration reduction in truss core sandwich plate with internal nonlinear energy sink

Jianen Chen[a,b*], Wei Zhang[c], Minghui Yao[c], Jun Liu[a,b], Min Sun[d]

[a] Tianjin Key Laboratory of the Design and Intelligent Control of the Advanced Mechatronical System, Tianjin University of Technology, Tianjin 300384, P. R. China

[b] National Demonstration Center for Experimental Mechanical and Electrical Engineering Education, Tianjin University of Technology, Tianjin 300384, P. R. China

[c] College of Mechanical Engineering, Beijing University of Technology, Beijing 100124, P. R. China

[d] School of Science, Tianjin Chengjian University, Tianjin 300384, P. R. China

Abstract: The effects of an internal nonlinear energy sink (NES) on a truss core sandwich plate in dynamics are investigated. The energy dissipation of the NES is studied with the sandwich plate excited by a half-wave shock. It is found that exceptional vibration absorption is achieved by the NES. Moreover, the relative motion between the sandwich plate and the NES remains in the acceptable range of the hollow truss core until the shock amplitude becomes too large. The slow flow equation and the frequency response of the system are obtained by employing the complexification-averaging method. Although the NES exhibits excellent performance when the sandwich plate is under an excitation with a relatively small amplitude, the efficiency is gradually diminished with the emergence of a stable higher branch and the merging of higher and lower branches. During the entire process, the NES does not collide with the face sheet of the sandwich plate. Further, the variation of vibration absorption performance of the NES with the increase of strut radius is investigated. It is demonstrated that the variation of the strut radius has a greater influence on the vibration absorption with a harmonic load in comparison to absorption with a shock load.

Key words: Sandwich plate; Nonlinear energy sink; Vibration reduction; Energy dissipation

1. Introduction

Sandwich structures are gradually being used in aeronautics and astronautics because of their advantages such as high weight efficiency and excellent characteristic of energy absorption. In view of the special structural feature of sandwich structure, the space utilization of hollow core has been gradually paid attention. The space is usually utilized to improve certain performance of the sandwich structures by filling materials or installing

*Corresponding Author, Email: vchenje@163.com