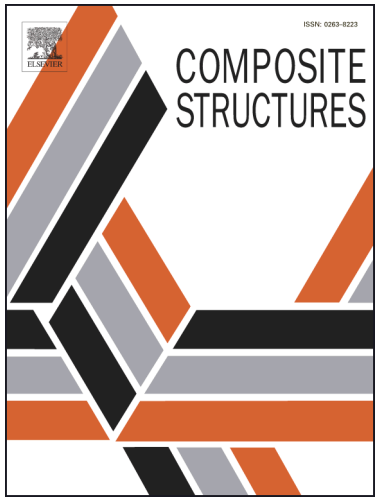

Bending properties of embedded co-cured damping composite structure simply supported on four edges

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Bending properties of embedded co-cured damping composite structure simply supported on four edges

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Abstract. The purpose of this paper is to obtain the bending properties of an embedded co-cured damping composite structure simply supported on four edges. To achieve this goal, the deflection value and strain energy of each stress component are deduced using the Ritz method. The results obtained show that the theoretical value and the value obtained by the finite element method are in good agreement with each other. Finally, the law of strain energy for individual stress with changes to various parameters is obtained, and the effect of each parameter on the deflection value is determined.

Keywords: Embedded and co-cured composite structure; strain energy; Ritz method; bending properties; deflection value

1. Introduction

Composite materials have been widely used in recent years because of their high specific strength, high specific stiffness and excellent damping characteristics. The designability of composite materials provides a broad space for further improvements to their mechanical properties and structural optimization [1, 6].

The embedded and co-cured damping composite structure (ECCDS) is a new type of pre-processing damping structure that consists of a composite layer with soft material layers embedded into the composite. The location and distribution of the soft material layers can be determined according to the design of the structure. In contrast with free damping structure and constrained damping structure, the damping layer of the structure is co-cured into the composite material, which protects it from the influence of the external environment. Therefore the structure has wide application prospect in high-speed and high-tech fields such as aircraft and aerospace equipment. The embedded and co-cured single-layer continuous damping composite is shown in Fig. 1.