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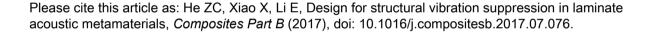
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Design for structural vibration suppression in laminate acoustic metamaterials

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**Abstract** 

This paper investigates the stopband of laminate acoustic metamaterials, which is composed

of carbon-fiber-reinforced polymer (CFRP) and a periodic array of mass-spring-damper

subsystems integrated with the laminates to act as vibration absorbers. Based on the

mathematical model derived in this work, a wide stopband is observed by dispersion analysis.

The frequency response analysis is performed to confirm its stopband behavior for a finite

laminate acoustic metamaterial. Due to the superior strength to weight ratio of CFRP, the

laminate acoustic metamaterials are able to have a much wider stopband than the conventional

metamaterial plates proposed in recent years. In addition, the effects of the relevant parameters

on the stopband of laminate acoustic metamaterial are discussed in this work. The excellent

performance of laminate acoustic metamaterials has been applied to design the vehicle door, and

the vibration of the vehicle door is suppressed significantly.

Key words: laminate acoustic metamaterials; stop-band; local resonance; CFRP

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