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电流变液夹层板结构动态特性及振动控制的实验研究

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EXPERIMENT STUDY ON THE DYNAMIC CHARACTERS AND VIBRATION CONTROL OF A SANDWICH PLATE WITH ELECTRO RHEOLOGICAL FLUID

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摘要

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摘要

采用表板为玻璃纤维板的电流变液夹层板进行动态特性试验, 分析和研究了含电流变液结构在外加不同电场时电流变液对结构特性的影响以及结构动态反应的变化。试验表明: 在电场强度增加的情况下, 电流变液夹层板能有效增大结构阻尼, 增加固有频率, 并较好地抑制结构共振峰, 控制结构的动力响应幅值。

关键词: 电流变液 振动控制 复合材料 结构阻尼

Abstract:

This paper investigates experimentally the dynamic characters and vibration control of a sandwich plate structure with electro rheological fluid as its core layer and glass fiber as two surface layers. The influences of ER fluid on the sandwich structure characters and dynamic response are studied under different applied external electric fields. It is found in the experiment that the damping and stiffness of the ER fluid sandwich plate and then its natural frequencies can be changed very quickly by the applied electric field and the damping increases greatly with the increasing of applied electric strength, the structural resonant peaks can be restrained and the vibration responses can be controlled by an external electric field. The effect of ER fluid on structure dynamic response is also influenced by the exciting frequencies.

Keywords: electrorheological fluid vibration control composite materials structure damping

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