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论文

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### 含SMA纤维的复合材料层合板的应力集中实验与分析

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### Analysis of Stress Concentration of Laminated Composite Plates Embedded with Shape Memory Alloy Fibers

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摘要

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**摘要** 由于具有形状记忆效应, 埋入复合材料层合板中的形状记忆合金纤维, 相变后将产生很大的回复应力, 不仅改善了整个承载结构的机械性能, 而且改变了危险区域的应力分布, 降低了应力集中程度。针对带孔的复合材料层合板, 通过拉伸实验及测定应力集中因子, 说明形状记忆合金纤维对于承载复合材料构件孔边附近区域的应力集中有很好的抑制作用, 孔边应力集中因子最大可降低9%。

**关键词:** 形状记忆合金 形状记忆效应 应力集中 马氏体相变 智能复合材料

**Abstract:** Due to the shape memory effect, shape memory alloy fibers, embedded in laminated composite plates, will generate large recovery stresses after phase transformation, not only to improve mechanical properties of the loaded structure, but also to change the stress distribution in the dangerous area and reduce stress concentration. In the case of a laminated composite plate with a circular hole, by conducting stretching tests and measuring the stress concentration factor, this paper demonstrates that shape memory alloy fibers have an effect of control over the stress concentration in the nearby area of the circular hole of the loaded composite component, where the stress concentration factor was reduced by 9% at the most.

**Keywords:** shape memory alloy (SMA) shape memory effect (SME) stress concentration Martensitic transformation smart composites

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