



航空学报 » 2006, Vol. 27 » Issue (5) :851-855 DOI:

论文

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混合机织复合材料刚度、强度及低速冲击性能试验研究

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Experimental Study on Stiffness, Strength and Low-Speed Impact Performance of Mixed Woven Composites

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摘要

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摘要 将二维机织碳布和单向预浸料碳布按照一定比例铺设成的混合机织复合材料兼具比刚度、比强度高、抗低速冲击损伤以及工艺性好等优点。试验测定不同比例的混合机织复合材料的面内刚度、强度,采用落锤法进行多个能量级别的低速冲击试验和准静态横向压缩试验,用超声波C-扫描法记录各试验件的内部损伤面积,并测量剩余压缩强度,分析这种混合机织复合材料在综合考虑刚度、强度以及低速冲击损伤容限等因素下的最佳铺层比例。

关键词: 混合机织复合材料 低速冲击 刚度 强度

Abstract: The laminates made by 2D carbon woven plies have better low-speed impact performance than those of unidirectional carbon tape laminates, but the woven ply is weaker than tape ply in in-plane maximal stiffness and strength. The mixed woven composites being laid up by these two kinds of layers alternately can have the advantages of impact performance, stiffness and strength together, and the processibility is good also. In this paper, first, experimental tests are performed on those mixed woven composites with four kinds different proportions of unidirectional plies to determine their stiffness and strength, and then the drop weight impact tests of different energy levels are performed. An ultrasonic C-scan method is used to detect the damage areas. The residual compress strength after impact is also investigated. The best proportion of unidirectional layer in the mixed woven composites considering stiffness, strength and damage tolerance of low-speed impact is studied.

Keywords: mixed woven composites low-speed impact stiffness strength

Received 2005-02-25; published 2006-10-25

引用本文:

王立朋;燕瑛;曾东;王国平. 混合机织复合材料刚度、强度及低速冲击性能试验研究[J]. 航空学报, 2006, 27(5): 851-855.

WANG Li-peng; YAN Ying; ZENG Dong; WANG Guo-ping. Experimental Study on Stiffness, Strength and Low-Speed Impact Performance of Mixed Woven Composites[J]. Acta Aeronautica et Astronautica Sinica, 2006, 27(5): 851-855.

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