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计及复合材料受剪板后屈曲的薄壁结构分析

田秀云¹, 杜洪增¹, 张行²

1. 中国民航学院; 2. 北京航空航天大学

THIN-WALLED STRUCTURE ANALYSIS WITH CONSIDERATION OF POST BUCKLING BEHAVIOUR OF COMPOSITE SHEAR PANELS

Tian Xiyun¹, Du Huengzeng¹, Zhang Xing²

1. Civil Aviation Institute of China; 2. Beijing University of Aeronautics and Astronautics

摘要

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摘要

本文提出了一种具有后屈曲复合材料受剪板的薄壁结构分析方法。假定后屈曲受剪板处于半张力场应力状态。以等效受剪板代替上述的后屈曲板,则可利用常规有限元法进行该结构分析。等效受剪板的刚度等于后屈曲复合材料受剪板的增量刚度,而后者系由余虚功原理与最小余能原理决定的。利用常规有限元法确定增量位移,然后再根据余虚功原理求得后屈曲复合材料受剪板的应力增量和应变增量。

关键词: 复合材料 后屈曲 半张力场 余虚功 剪切

Abstract:

In this paper, a method of analysing thin-walled structure with post-buckled composite shear panels is proposed. The post-buckled shear panels are assumed to be in a stress state of semi-tension field. The panels have been treated as equivalent shear panel, then the conventional finite element method can be employed in the analysis of this structure. The rigidity of the equivalent shear panel is equal to the incremental rigidity of the post-buckled composite shear panel, while the latter is determined by the principle of complementary virtual work and the principle of minimum complementary energy. The conventional finite element method can be applied in the determination of incremental displacements. Then, the incremental stress components and the incremental strain components of the post-buckled composite shear panels can be found by the principle of complementary virtual work.

Keywords: composite post-buckling semi-tension field complementary virtual work shear

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