



航空学报 » 2013, Vol. 34 » Issue (10) :2357-2363 DOI: 10.7527/S1000-6893.2013.0166

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### 复合材料增压舱双圆截面交点连接设计分析

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### Panel Splices Design and Analysis of Double Bubble Intersection in Composite Pressure Cabin

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摘要

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#### 摘要

按照连接设计要求及机身压差载荷水平,开展了复合材料增压舱双圆截面交点连接设计研究。采用壳-梁耦合有限元模型对两种双圆交点连接构型方案在压差载荷作用下的面外位移进行分析。在此基础上,对其中的对接连接构型方案进行强度校核:通过Fastener单元提取连接结构的钉载分布后,采用单钉模型进行细节结构强度校核,进而评估整个连接区的失效载荷。研究表明,采用对接的连接设计方案,双圆交点区在压差载荷下的横向变形较小,该设计方案能够满足设计要求。

关键词: 双圆截面 增压舱 复合材料 多钉连接 失效分析

#### Abstract:

According to the design criteria of mechanical joints and differential pressure load, a study is performed on panel splices design of a double bubble intersection in a composite pressure cabin structure. Two different panel splices of the double bubble intersection in a composite fuselage are designed under differential pressure loads, and the transverse displacement of the panels is analyzed by a shell-beam finite element model. Then the strength of butt joint concept is checked. The load distribution of the multiple-bolted joints in the structure is first calculated by using fastener elements; then the failure strength of the panel splices is assessed by failure analysis on single-bolted joints at critical locations. The result demonstrates that the butt joint design concept can improve the transverse displacement of the panels significantly under differential pressure loads and satisfy the design requirements.

Keywords: double bubble intersection pressure cabin composite multiple-bolted joint failure analysis

Received 2012-11-29; published 2013-03-19

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#### 引用本文:

钟小丹, 陈普会, 刘利阳, 王进. 复合材料增压舱双圆截面交点连接设计分析[J]. 航空学报, 2013, 34(10): 2357-2363. DOI: 10.7527/S1000-6893.2013.0166

ZHONG Xiaodan, CHEN Puhui, LIU Liyang, WANG Jin. Panel Splices Design and Analysis of Double Bubble Intersection in Composite Pressure Cabin[J]. Acta Aeronautica et Astronautica Sinica, 2013, 34(10): 2357-2363. DOI: 10.7527/S1000-6893.2013.0166

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