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复合材料飞机结构强度新规范要点评述

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The Outline of New Specifications on Strength of Composite Aircraft Structures

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摘要

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摘要 基于过去20多年参与复合材料结构设计的经验教训和美国最新的军用飞机设计规范,阐述了复合材料结构强度设计和验证要点及与金属结构的差别。其要点为:以承认性能表征多样性和材料与结构同时形成为基础的材料和工艺要求;以承认初始缺陷/损伤对结构静强度有影响为基础的设计许用值确定方法;以需要特别考虑湿热环境影响为特点的静强度设计和验证;以承认静力覆盖疲劳和考虑冲击损伤阻抗为特点的耐久性设计和验证;以冲击损伤及损伤无扩展为基础的损伤容限设计和验证;以全尺寸部件和由试样、元件(包括典型结构件)、组合件组成的多层次积木式设计验证方法相结合为基础的结构验证试验。

关键词: 复合材料 强度规范 静强度 耐久性 损伤容限 结构验证试验

Abstract: The outlines of the new military airplane structural strength specifications for composite structures and the differences from those of metallic structures are presented in this paper. These characterizations are: the material and process requirements based on the diversity of property characterization and synchronous formation of materials and structures; the determination methodology of design allowables based on considering the influence of initial flaw/damage on static structural strength; static strength design and verification considering specially the hydro-thermal influence; durability design and verification based on the concept, in which static strength design could cover fatigue design, and consideration of impact damage resistance; damage tolerance design and verification based on the main flaw/damage type of impact damage and damage non-propagation concept; and the structural verification test based on Building-Block Approach consisting.

Keywords: composites strength specification static strength durability damage tolerance structural verification test

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