



航空学报 » 2011, Vol. 32 » Issue (5) : 765-784 DOI:

综述

最新目录 | 下期目录 | 过刊浏览 | 高级检索

<< | Next Articles >>

层流流动控制技术及应用

朱自强, 吴宗成, 丁举春

北京航空航天大学 航空科学与工程学院, 北京 100191

Laminar Flow Control Technology and Application

ZHU Ziqiang, WU Zongcheng, DING Juchun

School of Aeronautic Science and Engineering, Beihang University, Beijing 100191, China

摘要

参考文献

相关文章

Download: PDF (3625KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 飞机受到的摩擦占其总阻力很大比例,减少摩擦对改善飞机性能和降低成本具有重要意义。层流摩擦远小于湍流摩擦,因此扩大层流区,甚至实现全层流流动是减阻的一个重要途径。为此,形成了包括自然层流流动、全层流流动和混合层流流动3种层流流动控制技术。本文从减阻分析,对3种层流流动控制技术的概念、方法、优缺点、可带来的效益,层流流动控制技术的设计方法,层流流动飞机的维护(包括防昆虫和冰粒等污染的措施)等方面作了较为系统的阐述。概要介绍了国外1930—2000年间层流流动控制技术的研究简况,并选择X-21A飞机缝道吸气飞行试验、Jetstar HLFC前缘系统模拟航线飞行的飞行试验、以及Boeing 757 HLFC飞行试验等重要项目为例阐述了层流流动控制技术的发展状况,指出了今后进一步研究的方向。

关键词: 层流流动控制 自然层流流动 全层流流动控制 混合层流流动控制 设计方法 飞行试验

Abstract: Friction drag is the major part of the total drag of a transport, so reducing it is essential for improving the performance and reducing the cost of a transport. Since laminar friction drag is much less than the turbulent one, one of the important measures for reducing it is to increase the laminar flow extent, and if possible, to realize a fully laminar flow. For that, three types of laminar flow control technology, i.e., natural laminar flow, fully laminar flow and hybrid laminar flow controls, are formed. In the present paper, drag reducing analysis, the concepts, methods, potential benefits and design methods of laminar flow control technology, and operational maintenance of a laminar flow aircraft (including protection of insect contamination and ice accumulation) are systematically described; Summary of researches of laminar flow control technology during 1930-2000 is briefly introduced and the progress in this field is shown by using examples of X-21A slotted suction flight tests, simulated airlines flight tests of Jetstar HLFC leading edge systems and Boeing 757 HLFC flight tests, and future research is also pointed out.

Keywords: laminar flow control natural laminar flow fully laminar flow control hybrid laminar flow control design method flight test

Received 2011-03-01;

About author: 朱自强(1936-) 男,教授,博士生导师。主要研究方向:计算流体力学、飞行器气动设计。 Tel: 010-82314186 E-mail: zhuzq@buaa.edu.cn 吴宗成(1967-) 女,博士,副研究员。主要研究方向:计算流体力学,飞行器气动设计。 Tel: 010-82339908 E-mail: wuzc@buaa.edu.cn 丁举春(1987-) 男,硕士研究生。主要研究方向:计算流体力学。 Tel: 010-82339908 E-mail: dingjuchun@163.com

引用本文:

朱自强, 吴宗成, 丁举春. 层流流动控制技术及应用[J]. 航空学报, 2011, 32(5): 765-784.

ZHU Ziqiang, WU Zongcheng, DING Juchun. Laminar Flow Control Technology and Application[J]. Acta Aeronautica et Astronautica Sinica, 2011, 32(5): 765-784.

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章

