



航空学报 » 1993, Vol. 14 » Issue (4) : 113-117 DOI:

论文

[最新目录](#) | [下期目录](#) | [过刊浏览](#) | [高级检索](#)

[<<](#) | [后一篇 >>](#)

超临界机翼气动设计的准则、流程和设计实例

沈克扬, 张锡华

上海民用飞机技术研究中心, 上海232-003信箱 200232

AERODYNAMIC DESIGN CRITERIA, DESIGN PROCEDURES AND A DESIGN EXAMPLE OF SUPERCRITICAL WING

Shen Ke-yang, Zhang Xi-hua

Shanghai Civil Aircraft Technology Research Center, P.O.Box 232-003, Shanghai, 200232

摘要

参考文献

相关文章

Download: [PDF \(240KB\)](#) [HTML 0KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 以计算空气动力学为基础,提出超临界机翼的气动设计准则和设计流程。翼型设计准则是:非设计状态音速区压力平坦;延迟后缘分离;设计状态迎角接近于零和局部最小厚度约束等。机翼设计准则是:在约束条件下诱导阻力最小;满足纵向稳定性要求;上翼面等压线型态和考虑结构弹性变形等。设计过程可分为两个阶段,即总体优化和机翼气动设计优化。后者的步骤是基本翼型设计、初始机翼外形设计、机翼巡航外形设计和机翼型架外形设计。对设计实例进行风洞试验后表明:尽管新机翼的平均厚度比某干线运输机厚14%,但安装该机翼的干线运输机巡航效率仍比前者高12%。

关键词: 超临界翼型 超临界和机翼 设计 计算空气动力学

Abstract: The aerodynamic design criteria and design procedures for supercritical wing are established based on the computational aerodynamics. For supercritical airfoil design, the criteria contain (a) sonic plateau pressure distribution at off design condition, (b) retarding trailing edge flow separation, (c) near-zero angle of attack at design condition, and (d) local thickness constraints. For supercritical wing design, the criteria include (a) induced drag minimization under some constraints, (b) meeting stability requirement, (c) isobar pattern on the upper wing surface, and (d) considering elastic deformation of two wing. The supercritical wing design procedures can be divided into the phases, i.e. configuration design phase and aerodynamic efficiency optimization phase. The latter contains four steps: (a) basic airfoil design, (b) initial wing design, (c) cruise wing shape design, and (d) jig wing shape design. As a design example, a supercritical wing is designed and is tested in wind tunnel. The result indicates that the complete aircraft with the supercritical wing designed according to the present method has 12% higher cruise efficiency than a typical commercial airliner, although the former wing is 14% thicker than the latter one, which shows the present aerodynamic design method for supercritical wing is practically effective.

Keywords: supercritical airfoil supercritical wing design computational aerodynamics

Received 1991-03-11; published 1993-04-25

引用本文:

沈克扬,张锡华. 超临界机翼气动设计的准则、流程和设计实例[J]. 航空学报, 1993, 14(4): 113-117.

Shen Ke-yang; Zhang Xi-hua. AERODYNAMIC DESIGN CRITERIA, DESIGN PROCEDURES AND A DESIGN EXAMPLE OF SUPERCRITICAL WING[J]. Acta Aeronautica et Astronautica Sinica, 1993, 14(4): 113-117.

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

- ▶ 沈克扬
- ▶ 张锡华