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论文

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民用飞机客舱快速设计及自动化调整

罗明强, 冯昊成, 刘虎, 武哲

北京航空航天大学 513教研室

Rapid Cabin Design and Automated Scheme Adjustment for Civil Aircraft

Luo Mingqiang, Feng Haocheng, Liu Hu, Wu Zhe

Faculty 513, Beijing University of Aeronautics and Astronautics

摘要

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摘要 为提高总体设计的质量和效率,研究了民用飞机机身剖面构型及客舱的设计措施,并在一个开放式飞机总体设计环境中实现这一功能。定义了飞机机身类部件坐标系,提出了机身剖面构型、地板、装饰层、厨房、卫生间、衣帽间、应急出口、舱门、舱段隔板、座椅和行李架等的参数化描述和模型构建方法,设计了客舱参数化描述数据结构、剖面构型与客舱布置的数据对应关系及客舱设计逻辑,建立了交互式机身剖面构型和客舱二、三维快速设计环境。在此基础上,实现了客舱模型的自动化调整,为总体设计阶段进行多学科设计优化奠定了基础。最后,给出若干设计实例说明了该方法的有效性。

关键词: 飞机工程 总体设计 客舱 参数化造型 自动调整

Abstract: In order to improve the quality and efficiency of civil aircraft conceptual/preliminary design, the implementation of fuselage section and cabin design in a computer aided aircraft conceptual/preliminary design system is studied. The coordinates of fuselage like components are defined. The parametric modes of section, cabin floor, furnishment, cookroom, washroom, cloakroom, emergency exit, port, dummy plate, seat and baggage rack are presented. The data structure and defining logic representing the cabin and section are designed. A prototype system for the fuselage section and cabin design is constructed. Automatic adjustment for the cabin is implemented, which is the basis for multidisciplinary design optimization that takes into account such factors as weight, aerodynamics and structure. Finally, several instances are given to illustrate that the methods of cabin design and automated adjustment are effective.

Keywords: aircraft engineering conceptual design cabins parametric modeling automated adjustment

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Corresponding Authors: 罗明强

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