



航空学报 » 2009, Vol. 30 » Issue (1) :30-39 DOI:

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歼击机座舱空气流动和传热的数值模拟与实验

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Numerical Simulation and Experiment on Air Flow and Heat Transfer in Fighter Plane Cockpit

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摘要

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摘要

根据歼击机座舱内空气流动和传热的特点,建立了座舱内壁面传热边界条件计算模型和空气分配系统供气边界条件计算模型,在此基础上建立了歼击机座舱流场和温度场数值仿真平台,并利用地面模拟实验验证了仿真平台的有效性。计算结果与实验结果的对比表明:该平台能较真实地反映座舱壁面传热的不均匀性,以及空气分配系统供气孔口流出气流量和温度的不均匀性与非对称性;速度场和温度场计算结果与实验结果的误差分别约为15%和6%,这证明了该平台具有较高的模拟精度和工程应用价值。

关键词: 座舱 空气分配系统 数值模拟 流场 温度场

Abstract:

A wall heat transfer boundary condition model and an air supply boundary condition model of the air distribution system of a fighter plane cockpit are established according to its features of air flow and heat transfer. Based on these two models, an air velocity and temperature numerical simulation flat of the cockpit is established and an experiment is carried out to prove the effectiveness of the simulation flat. The comparison between calculation result and experiment result shows that the flat can indicate the unevenness and the asymmetry of the heat transfer through walls and the air flux and temperature out of the air supply holes on the air distribution system. The calculation error of velocity and temperature is 15% and 6% respectively, which proves that the flat has rather high precision and engineering value.

Keywords: cockpit air distribution system numerical simulation flow field temperature field

Received 2008-06-26; published 2009-01-25

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引用本文:

沈海峰;袁修干. 歼击机座舱空气流动和传热的数值模拟与实验[J]. 航空学报, 2009, 30(1): 30-39.DOI:

Shen Haifeng; Yuan Xiugan. Numerical Simulation and Experiment on Air Flow and Heat Transfer in Fighter Plane Cockpit[J]. Acta Aeronautica et Astronautica Sinica, 2009, 30(1): 30-39.DOI:

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