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## 类乘波体防热壁板气动加热-温度场耦合特性分析

### Analysis of aeroheating-temperature field coupling characteristics for thermal protection panel of quasi-wavrider

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中文摘要:

针对类乘波体防热壁板, 采用松耦合算法推进气动热和传热迭代计算, 研究气动加热-温度场的耦合特性. 结果表明: 在壁板达到辐射平衡前, 冷壁热流和辐射平衡热流与真实气动加热的误差分别达+55.1%和-15.4%以上, 必须将气动加热和温度场进行耦合分析; 当地绝热壁面温度不随时间变化, 表面传热系数是耦合效应的关键参数; 采用平均表面传热系数进行瞬态气动加热-温度场耦合计算只进行2次气动加热计算, 壁面温度预测误差在2.5%以内, 可有效提高气动加热-温度场耦合计算的效率.

英文摘要:

For thermal protection panel of quasi-wavrider, the loose coupling algorithm was applied to drive the iteration of the aeroheating and heat transfer analysis. Then, the coupling characteristics of aeroheating-temperature field were studied. The results show that, before radiative equilibrium, the errors of cold wall and radiative equilibrium aeroheating are +55.1% and -15.4% over actual aeroheating respectively, so coupling analysis for aeroheating-temperature field was required. As the local adiabatic wall temperature is not changed with time, the surface heat-transfer coefficient is a key parameter for coupling effect. Only two aeroheating calculations are needed during calculation of coupling aeroheating-temperature field with average heat convection coefficient, and the error of predicted wall temperature is less than 2.5%, thus highly improving the analysis efficiency of coupled aeroheating-temperature field.

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