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大攻角下前机身-进气道组合体的流场计算

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SOLUTION OF EULER EQUATIONS FOR FIGHTER FOREBODY-INLET COMBINATION AT HIGH ANGLE OF ATTACK

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摘要 本文发展了一种飞机前机身-进气道组合体非粘性流场的多区域数值模拟方法。通过求解三维欧拉方程来模拟不同飞机速度(亚、跨、超音速),攻角(<15°)和发动机流量条件下的进气道性能,并给出了一种新的进气道出口边界条件处理办法。

关键词： 进气道 欧拉方程 大攻角

Abstract： A computational procedure has been developed to predict inviscid flows over integrated forebody-inlet combination. The analysis, which includes the effect of Mach number, angle of attack and engine mass flow, is based on the solution of 3-D Euler Equations. A finite volume spatial discretization and Runge-Kutta time stepping scheme are employed to solve the equations.To achieve the required geometric flexibility, a multi-zone mesh is used. The whole computational domain is divided into three zones. The mesh of each zone is generated interpolating the fluxes across the interface between adjacent zones during iterations. A new type of treament of inlet exit boundry conditions has been developed and tested.The procedure has been applied to forebody-inlet analysis for a range of flight conditions including subsonic, transonic and supersonic flight with various engine mass flows and angles of attack. Especially the steady states of supersonic flight at up to 10 degree angle of attack for subcritical regime of engine are obtained.The results are in good agreement with the experimental data.

Keywords： inlet Euler Equations high Angle of Attack

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