Numerical Aeroheating Analysis of Revolutionary Body

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Abstract

When the two-dimensional revolutionary Body is numerically simulated along the ballistics, a local high heat flow region is formed at the head stagnation point. Accurately simulating the Aeroheating peak is extremely important for the thermal protection. If the traditional grid topology is used for the simulation, the peak of the stagnation point of the head appears to have large fluctuations along the trajectory, and the misalignment occurs.

Aiming at this phenomenon, the finite element method is used to solve the N-S equation for the aeroheating calculation of the two-dimensional revolutionary Body. A new adaptive grid processing method is introduced, and the numerical simulation is performed according to the ballistic data. Calculate the heat flow of the rotating stagnation point. The CFD calculation results are compared with the traditional Fay-Riddell formula. The CFD calculation results are about 400kw/m2. The Fay-Riddell formula calculates the result to be about 380kw/m2, and the relative error is less than 10%. The result is accurate.

Keywords: Revolutionary Body, Aeroheating, N-S equation.