

عنوان مقاله:

Numerical calculation of radiation heating of the hypersonic nose in the reentry phase

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خلاصه مقاله:

The calculation of aerodynamic heating is one of the most important steps in designing high speed flying bodies, especially reentry bodies. Because ignoring that, it can damage the thermal protection system and cut off the radar connections to the reentry capsule. Due to the high speed of the capsule and the lack of a material medium, the radiation heat transfer rate is important in comparison to the convection heat transfer rate of the displacement in determining the total thermal flux, and ignoring it in the calculations caused many errors in the determination of the total heat flux. In this paper, various parameters affecting the heat transfer rate of the nose of the reentry capsule have been investigated. To calculate the capsule nose radiation, a theoretical method is presented which is compared with the reference simulation results to confirm its correctness. In this simulation, the heat transfer rate of the ApolloF capsule has been investigated. Due to the low optical thickness of the model, the DO radiation model is used to simulate CFD. This simulation was carried out using Fluent software version ۱۶ and solved with a laminar flow of gray gas and non-gray gas. The results show that the radiation heat transfer rate in non-gray gas mode is lower error than the gray gas state, and it is also observed that at high altitudes, the radiation transfer rate is ۸۰% of the total heat transfer rate.

کلمات کلیدی:

Radiation, capsule, Gray gas, Non-gray gas, Do radiation model

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