

Flow Distribution of Hydrocarbon fuel in Parallel Channels

**CHU Min, CHEN Si-yuan, HU Long-fei, HAN Hai-tao, LUO Xiao-guang,
AI Bang-cheng**

China Academy of Aerospace Aerodynamics, China

Abstract:

The flow distribution characteristics of multi-branch parallel channels in the fuel active cooling are studied. The influence of cooling channel configuration is analyzed by computational fluid dynamics simulations. The results show that a poor design of channel configuration will lead to a large difference in "cold flow resistance" between different branches, and it is easier to induce severe flow mal-distribution. From the perspective of destroying the positive feedback mechanism, a new thermal protection technology combining heat pipe cooling and fuel active cooling is proposed. Through numerical simulations, it is proved that the rapid heat transfer characteristics of high temperature heat pipes can effectively limit the difference of "heat flow resistance" between branches. The difference of total flow resistance between branches can be effectively reduced by proper design of channel configuration, and the flow distribution characteristics of multi-branch parallel channels can be significantly improved.

Key words: parallel channels; regenerative cooling; flow distribution; numerical study