IAF SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic Air-breathing and Combined Cycle Propulsion, and Hypersonic Vehicle (7)

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NUMERICAL STUDY OF JAXA'S EXPERIMENTAL VEHICLE FOR HYPERSONIC FLIGHT

Abstract

Instead of the Space Shuttle retired in 2011, various concepts for reusable space transportation systems are currently being proposed around the world. Ram / scramjet engines are promising propulsion systems for future transportation systems and are being studied in the United States and around the world. At Kakuda Space Center of JAXA, ram / scramjet engine combustion tests have been conducted using the ramjet engine test facility (RJTF), and various data have been obtained. However, the difference between the wind tunnel airflow and the actual flight airflow may result in differences in combustion. Therefore, we are developing tools to estimate flight data from wind tunnel data. JAXA plans to conduct the experimental vehicle for hypersonic flight. The final goal of the project is set to conduct the flight experiment to obtain the supersonic combustion data in the real flight and to validate the prediction tool by the flight data. In this study, the experimental vehicle was designed and the aerodynamics characteristics were investigated numerically. Mach number distribution around the vehicle was investigated. Numerical results were validated by the hypersonic wind tunnel data. In addition to the CFD results, the trajectory analysis of the hypersonic flight experiments was conducted.