Aerodynamics of Re-entry Vehicle System with Inflatable Ballute

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Responsible Representative

Hirotaka Otsu, Professor, Ryukoku University

Contact Information

Hirotaka Otsu, Professor, Ryukoku University(otsu@rins.ryukoku.ac.jp)

Members

Shinichiro Mekata, Hirotaka Otsu

Abstract

To determine the aerodynamic characteristics of a flight vehicle equipped with an inflatable ballute. In particular, the influence of the deformation of the ballute on the aerodynamic characteristics will be investigated.

Reasons and benefits of using JAXA Supercomputer System

There have been many shapes depending on the deformation of ballute with various flight conditions such as Mach number and the tilt angle.

Achievements of the Year

In this year's analysis, the effects of the deformation of the ballute on the pressure distribution and flow field were investigated. The deformation of the ballute was measured in a wind tunnel experiment, and the deformed shape was created using OpenSCAD, a software program that can create shapes using mathematical formulas. The grid required for the analysis was created using HexaGrid v1.1, and the analysis was performed using FaSTAR. Figure 1 shows the pressure distribution on the ballute surface. The results show that when the deformation is small, the pressure distribution on the ballute surface is almost uniform, whereas when the deformation is large, the pressure distribution changes significantly depending on the surface deformation. It was also confirmed that when shock wave interference occurs, a local pressure increase occurs.

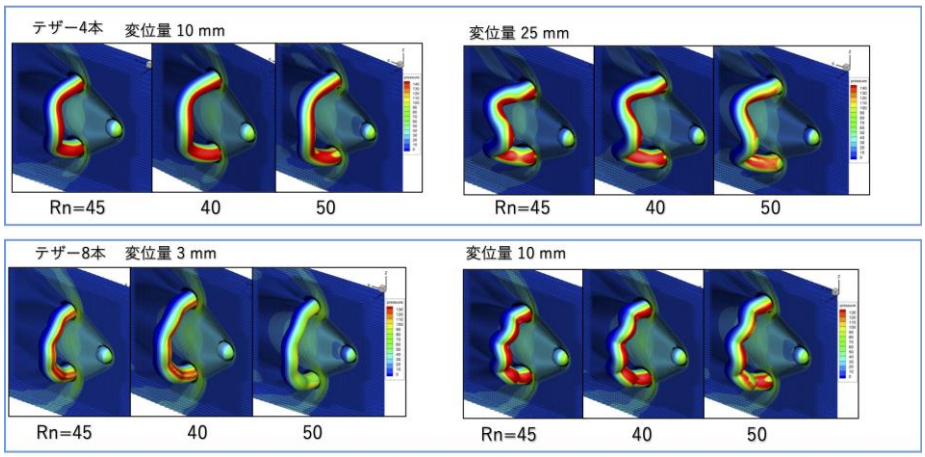

Fig. 1: Comparison of surface pressure by the deformation of the ballute

- **Publications**

N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	64
Elapsed Time per Case	30 Minute(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.00

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	77.33	0.00
TOKI-ST	61.11	0.00
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	15.00	0.01
/data and /data2	150.00	0.00
/ssd	150.00	0.02

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	0.00	0.00

*1: Fraction of Usage in Total Resources: Weighted average of three resource types (Computing, File System, and Archiver).

*2: Fraction of Usage：Percentage of usage relative to each resource used in one year.

- **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage*2 (%)
ISV Software Licenses (Total)	0.00	0.00

*2: Fraction of Usage：Percentage of usage relative to each resource used in one year.