Utilization of RCS Jet interaction for Reinforcing Attitude Contorol Ability

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● **Abstract**

In some cases, a lifting reentry capsule does not have enough attitude control ability. The purpose of this study is to utilize RCS interaction as an auxillary control force by local modification of capsule's external shape.

● **Reasons for using JSS2**

The use of JSS2 was necessary for performing a lot of CFD simulations in which external shape of capsule and strength of RCS jet were varied.

● **Achievements of the Year**

CFD analysises using FaSTAR code were performed on a capsule which has a bulge around its RCS nozzle. The simulation results were compared with experimental data aquired from a hypersonic wind tunnel test, and it showed good agreement in terms of both interaction force and heating rate (Fig. 1). In addiition, the validated CFD technique was used for investigating a smaller bulge shape which is applicable to a real capsule, and it supported a design process of a improved wind tunnel model.
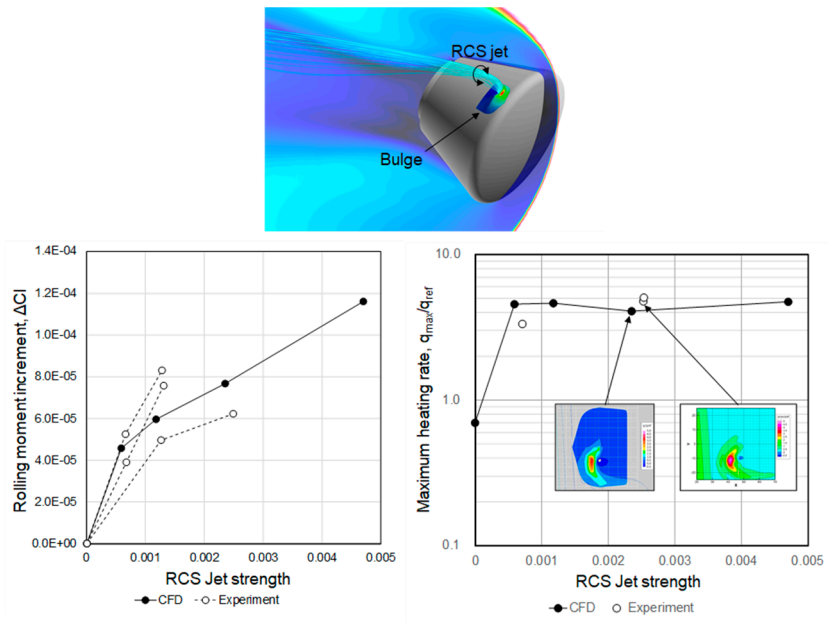
Fig. 1: CFD results on a reentry capsule with a bulge

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	128
Elapsed Time per Case	20 Hour (s)

● **Resources Used**

Fraction of Usage in Total Resources[*1] (%): 0.11

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2] (%)
SORA-MA	1,009,475.98	0.12
SORA-PP	223.45	0.00
SORA-LM	0.00	0.00
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	11.28	0.01
/data	1,493.76	0.03
/ltmp	2,180.99	0.19

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.