

## Aerodynamic testing technology for reentering capsules

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### ● **Abstract**

To enhance hypersonic aerodynamic testing technology especially for reentering vehicles through developing understanding about the hypersonic wind tunnel nozzle flow which affects a lot estimation error to the flight characteristics and through defining the ability in predicting RCS jet interaction.

### ● **Reasons and benefits of using JAXA Supercomputer System**

Since it perfectly suits the requirement in calculating heavy RCS jet interaction flow field and the hypersonic nozzle flow. Useful tools such as Fastar is another.

### ● **Achievements of the Year**

JAXA1.27m hypersonic wind tunnel was numerically solved. The numerical result of  $p_{02}/p_0$  at the nozzle exit was compared with the experimental data ( $p_0$ :reservoir pressure,  $p_{02}$ :pitot pressure). As shown in Figs.1 and 2., the quantitative tendency was successfully observed.

Also, predicting ability in the RCS jet interaction has been evaluated with the hypersonic wind tunnel tests.

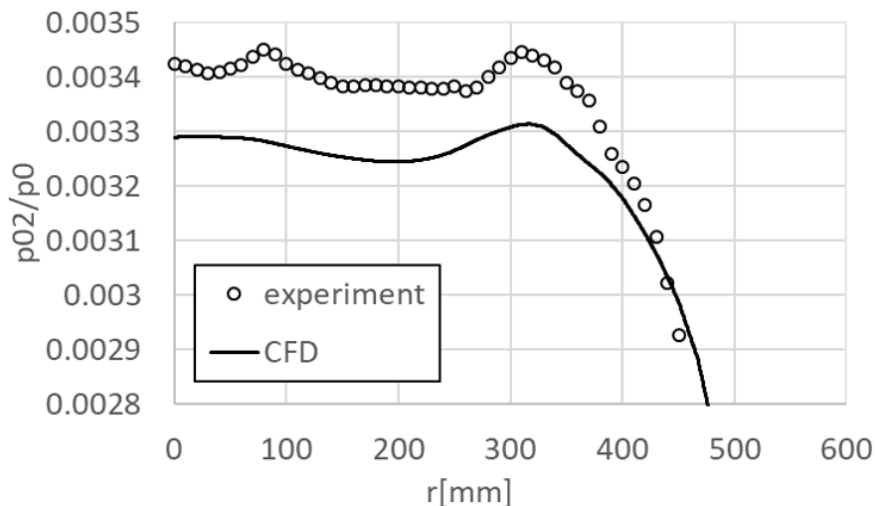


Fig. 1: Comparison of  $p_{02}/p_0$  at the nozzle exit between experiment and calculation

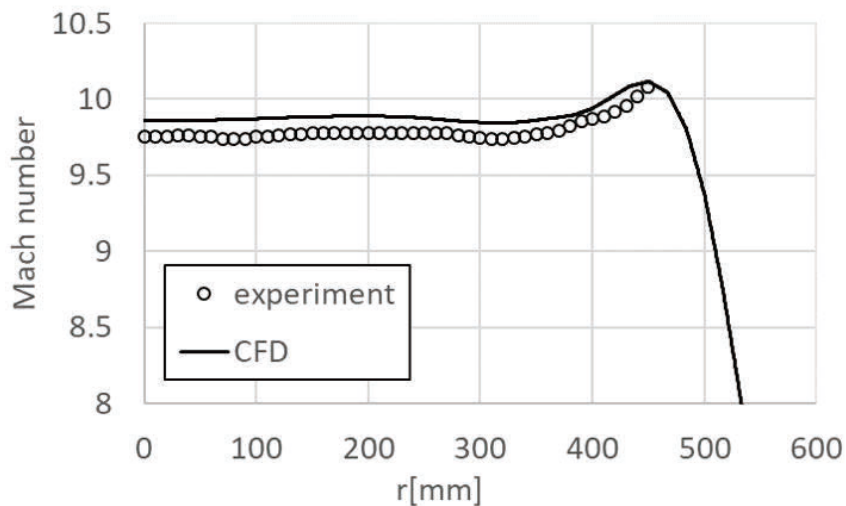


Fig. 2: Comparison of Mach number at the nozzle exit between experiment and calculation

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	32 - 128
Elapsed Time per Case	50 Hour(s)

- **Resources Used**

Fraction of Usage in Total Resources\*1(%): 0.09

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
SORA-MA	767,913.67	0.09
SORA-PP	283.26	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	79.75	0.07
/data	3,050.09	0.05
/ltmp	2,525.11	0.21

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	2.70	0.07

\*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.