

Launch Cost Reduction by Reusing Launch Vehicles

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● Abstract

This research conducts the study of key technologies applied to future reusable launch vehicles including long-life rocket engines, lightweight structures, landing guidance, and small experimental vehicles to validate the technologies.

● Reasons for using of JSS2

JSS2 is necessary for the estimation of aerodynamic performance for a small experimental vehicle.

● Achievements of the Year

CFD in the rocket launch phase was conducted as follows:

- 1) the inside of the rocket nozzle was not calculated.
- 2) the static pressure, static temperature, and velocity at the nozzle exit were given as the boundary condition.

The calculation started from the first-order accuracy with the pressure at the nozzle exit one third of the nominal value. The calculation was gradually accelerated, and successfully converged at the second-order accuracy with the pressure of the nozzle exit the nominal value.

The axial velocity distribution in the vicinity of the nozzle exit is shown in (Fig. 1). Mach number is 0.1. The angle of attack is 0 deg.

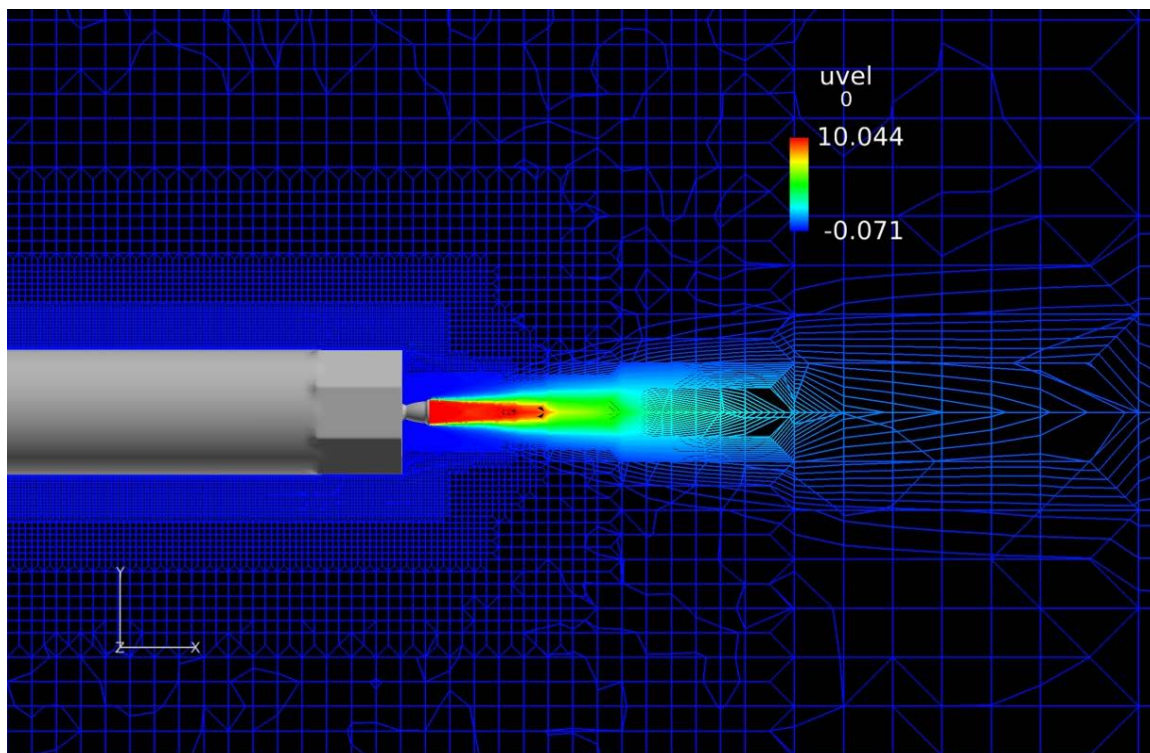


Fig.1 Axial velocity distribution at the lift-off (M=0.1, AOA=0deg)

● Publications

N/A

● Usage of JSS2

● Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	96
Elapsed Time per Case	300.00 hours

● Resources Used

Fraction of Usage in Total Resources*1 (%): 0.23

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	1,895,520.26	0.25
SORA-PP	113.88	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	037.71	0.03
/data	889.02	0.02
/ltmp	634.77	0.05

Archiver Resources		
Archiver System 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