

Numerical Simulations for H3 Rocket Development

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● Abstract

Please refer to the following URL: <http://global.jaxa.jp/projects/rockets/h3/>

● Reasons for using of JSS2

Risk management is the key to make a success of a large-scale development project like H3 rocket. This is because its development schedule and cost could be significantly influenced by the face of imminent risks when new technologies are under system-level verification and validation. In order to complete the project under defined period and cost, a variety of efforts are essential for planning and process of technology development itself in terms of efficiency and certainty. In that context, numerical simulation technologies and JSS2 have been playing one of major roles to make the H3 project a success.

● Achievements of the Year

With regard to the booster engine, 'LE-9', under detailed design phase, evaluation of design and risks as well as studies for improvement were carried out by making full use of JSS2.

● **Publications**

● Presentations

- 1) Funo, Y., et al., "Progress Report of Detailed Design of H3 rocket," 40th Space Development and Utilization Division of Research and Development Bureau in MEXT(the Ministry of Education, Culture, Sports, Science and Technology), Jan. 24th, 2018.
- 2) Azuma, N., et al., "Development Status of LE-9 Engine Turbopumps," AIAA Propulsion and Energy Forum, 53rd AIAA/SAE/ASEE Joint Propulsion Conference, Atlanta, G.A., July 10-12, 2017.

● **Usage of JSS2**

● **Computational Information**

Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	2 - 2500
Elapsed Time per Case	300.00 hours

● **Resources Used**

Fraction of Usage in Total Resources*1 (%): 7.19

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	60,494,643.13	8.00
SORA-PP	6,871.84	0.09
SORA-LM	220.72	0.11
SORA-TPP	53,598.70	0.29

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	10,303.37	7.14
/data	69,123.46	1.28
/ltmp	5,110.81	0.39

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	104.20	4.48

*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