

## Numerical analysis for turbo pumps

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### ● Abstract

Design evaluation using numerical simulation is carried out for technical issues of the LE-9 engine turbo pump.

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

In order to carry out large-scale numerical analysis of multiple cases in a short period of time.

### ● Achievements of the Year

The analysis of forced resonance of turbine rotors has been carried out, and the results have been reflected to LE-9 turbo pump design.

### ● Publications

- Non peer-reviewed papers

Azuma et al, "The Development Status of LE-9 Engine Turbopump for H3 Launch Vehicle", AIAA Propulsion and Energy Forum, Indianapolis, AIAA Paper 2019-4439, August, 19-22, 2019

### ● Usage of JSS2

#### ● Computational Information

Process Parallelization Methods	XPFortran
Thread Parallelization Methods	OpenMP
Number of Processes	20 - 960
Elapsed Time per Case	500 Hour(s)

- **Resources Used**

Fraction of Usage in Total Resources\*1(%): 2.91

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
SORA-MA	26,411,763.52	3.21
SORA-PP	8,077.66	0.05
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	3,680.62	3.07
/data	16,850.50	0.29
/ltmp	2,393.54	0.20

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	0.26	0.01

\*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.