

Numerical analysis for LE-9 engine turbopumps

Report Number: R21EK2305

Subject Category: Space Technology

URL: <https://www.jss.jaxa.jp/en/ar/e2021/18127/>

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● Abstract

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

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

● 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 and reflect those results quickly because redesign as feedbacks of engine firing test is needed.

● Achievements of the Year

Large-scale and high fidelity CFD of multiple design proposals of turbine blades has been carried out, and aerodynamic damping ratio, which indicates the margin for flutter, has been evaluated. Quick reflection of results helped to reduce design evaluation time.

● Publications

N/A

● Usage of JSS

● Computational Information

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

● JSS3 Resources Used

Fraction of Usage in Total Resources*1(%): 3.01

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	71,532,413.35	3.48
TOKI-ST	5,547.96	0.01
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	6,378.17	6.34
/data and /data2	124,410.00	1.33
/ssd	32,586.67	8.42

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	16.61	0.11

*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.

● **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage*2(%)
ISV Software Licenses (Total)	0.00	0.00

*2: Fraction of Usage : Percentage of usage relative to each resource used in one year.