Numerical analysis for LE-9 engine turbopumps

● **Responsible Representative**

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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**

Lage-scale and high fidelity flutter analyses at off-nominal conditions have been carried out. As a result, risks of flutter occurrence have been confirmed to be reduced by comparing computed aerodynamic damping ratio, which indicates the margin for flutter, against actual test results.

● **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](%): 1.97

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	53,612,668.27	2.34
TOKI-ST	6,746.11	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	6,370.27	5.77
/data and /data2	133,907.62	1.03
/ssd	32,504.60	4.50

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	16.94	0.08

[*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.

- **ISV Software Licenses Used**