

Numerical analysis for Turbopumps

Report Number: R18EK2305

Subject Category: Space Technology

URL: <https://www.jss.jaxa.jp/en/ar/e2018/9152/>

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● Abstract

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

● Reasons for using JSS2

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

● Achievements of the Year

Especially, with regard to the issue of turbine flutter stability, occurrence conditions of flutter instability were identified by large-scale numerical analysis using JSS2. And the findings were reflected in design changes of the turbo pump.

● Publications

- Non peer-reviewed papers

(1) Ogawa, Y., et al., “The latest Development Status of LE-9 Engine Turbopumps,” AIAA Propulsion and Energy Forum, Cincinnati, Ohio, AIAA Paper 2018-4550, July 9-11, 2018.

● 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 (%): 4.58

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage* ² (%)
SORA-MA	42,789,398.36	5.24
SORA-PP	13,829.28	0.11
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	584.36	0.60
/data	15,222.89	0.27
/tmp	2,393.54	0.20

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage* ² (%)
J-SPACE	0.10	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.