

## Advanced simulation of internal flow in rotating machinery

Report Number: R20EA2111

Subject Category: Aeronautical Technology

URL: <https://www.jss.jaxa.jp/en/ar/e2020/14176/>

### ● Responsible Representative

Tatsuya Ishii, Aeronautical Technology Directorate, Propulsion Research Unit

### ● Contact Information

Junichi Kazawa, Aeronautical Technology Directorate, Propulsion Research Unit(kazawa.junichi@jaxa.jp)

### ● Members

Junichi Kazawa

### ● Abstract

Implement LES and DES in the rotating coordinate system to improve the aerodynamic performance prediction accuracy of rotating machine like fan, compressor, and so on, flows by numerical simulation.

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

LES and DES for rotating machines have a huge number of grid points and a high computational load. For this reason, calculations cannot be performed without JSS2.

### ● Achievements of the Year

DES analysis was performed on the centrifugal compressor. It was confirmed that fine vortices can be captured by using a scheme with weak numerical viscosity.

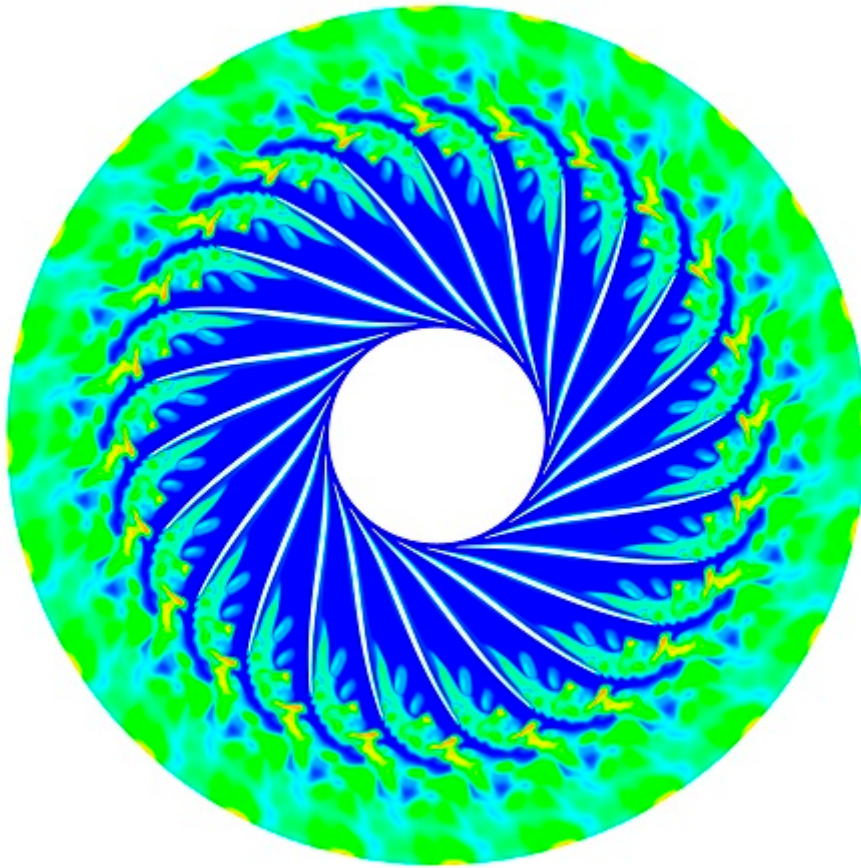


Fig. 1: Centrifugal compressor internal flow (entropy distribution)

● **Publications**

N/A

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	Automatic Parallelization
Number of Processes	64 - 106
Elapsed Time per Case	100 Hour(s)

- **Resources Used(JSS2)**

Fraction of Usage in Total Resources\*1(%): 0.02

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
SORA-MA	0.00	0.00
SORA-PP	36,979.34	0.29
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	9.99	0.01
/data	958.22	0.02
/tmp	2,046.13	0.17

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	0.00	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.

● **Resources Used(JSS3)**

Fraction of Usage in Total Resources\*1(%): 0.00

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	0.00	0.00
TOKI-RURI	0.00	0.00
TOKI-TRURI	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	0.56	0.00
/data	5.61	0.00
/ssd	5.61	0.00

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	0.00	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.