

## Improvement of numerical analysis for internal flow with complicated configuration inside aero-engine

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### ● Abstract

Unstructured-grid flow solver FaSTAR-Move-AE are applied to aero-engine analysis with complicated configuration. Through the calculation, these programs are tested and investigated for the deficiency and future issue for improvement of accuracy.

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

For large scale computations in the future, programs should be tested under the same computational environment.

### ● Achievements of the Year

To validate the DES/LES analysis function of FaSTAR-Move-AE, we performed DES/LES analyses of a simple linear cascade and a centrifugal compressor with complex geometry. We confirmed the validity of the analysis.

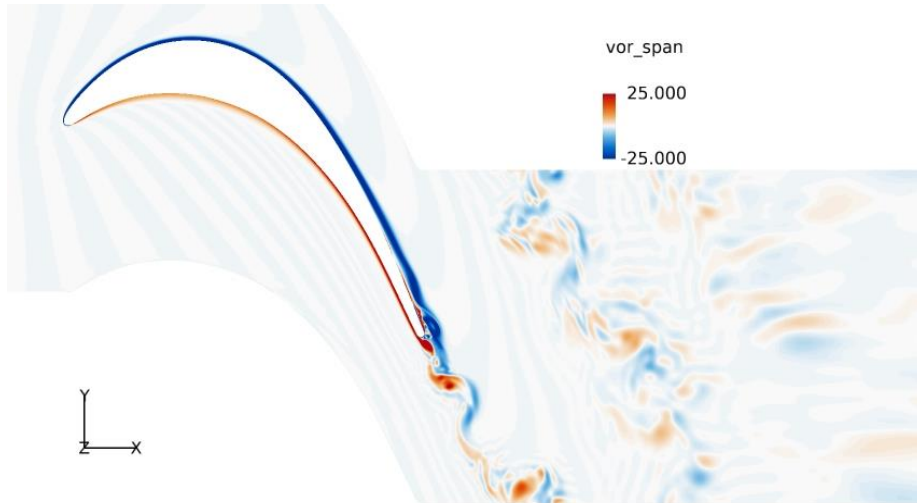


Fig. 1: Analysis result of a linear cascade: vorticity distribution

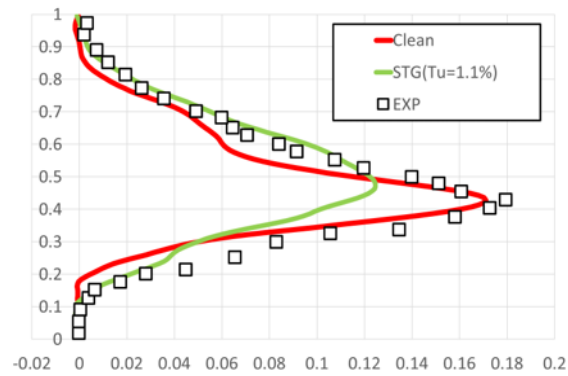


Fig. 2: Comparison with experiment and analysis results in total pressure loss distribution of the wake.

● **Publications**

N/A

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	32 - 2048
Elapsed Time per Case	72 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources\*1(%): 0.09

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	1,506,505.19	0.07
TOKI-ST	261,952.40	0.26
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	6,531.77	0.44
TOKI-TST	0.59	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	442.05	0.40
/data and /data2	81,742.83	0.63
/ssd	2,774.81	0.38

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	29.62	0.13

\*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 <sup>*2</sup> (%)
ISV Software Licenses (Total)	1,056.93	0.74

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