

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

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● **Abstract**

Unstructured-grid flow solver FaSTAR-Move 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**

In order to validate the complex shape analysis function of FaSTAR-Move, analyses of an axial turbine with colling holes and a centrifugal compressor are conducted. It is confirmed that the function is appropriate.

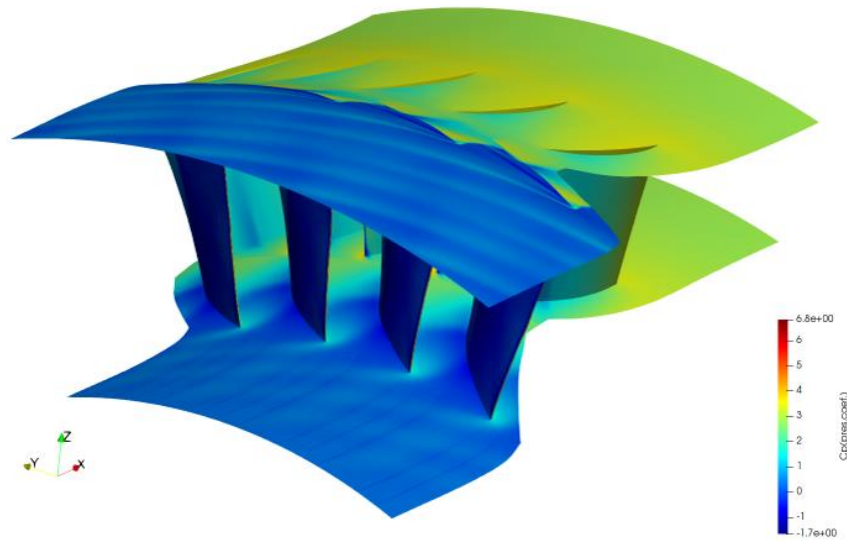


Fig. 1: Analysis result of axial flow compressor (stage 37) by mixing plane method: Cp distribution.

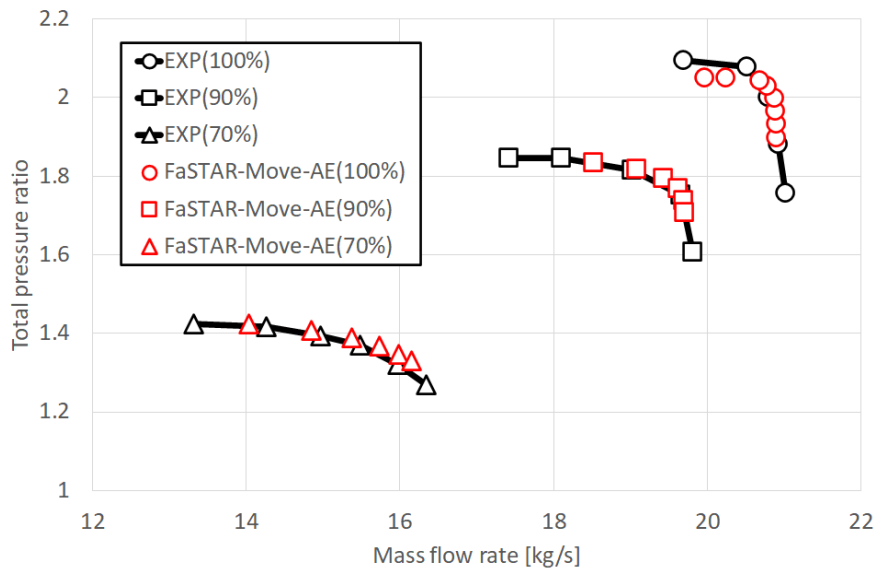


Fig. 2: Analysis result of axial flow compressor (stage 37) by mixing plane method: Relation of Total pressure ratio and mass flow rate at 100%, 90%, 70% rotation speeds.

● Publications

N/A

● Usage of JSS

● Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	4 - 1024
Elapsed Time per Case	72 Hour(s)

● JSS3 Resources Used

Fraction of Usage in Total Resources*1(%): 0.20

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	4,442,536.43	0.22
TOKI-ST	48,502.61	0.06
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	1,655.40	0.12
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	684.49	0.68
/data and /data2	96,924.40	1.04
/ssd	4,068.37	1.05

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	30.91	0.21

*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)	945.16	0.66

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