

Robust design for Jet Engine/Development of Robust design technology

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● Abstract

Solve the technical challenges involved in realizing small-core jet engines.

● Reasons and benefits of using JAXA Supercomputer System

The calculation domain is the high pressure turbine - strut - low pressure turbine, so the calculation scale is large and the analysis can only be performed using JSS3.

● Achievements of the Year

Verifications of cascade flutter were carried out and compared with the test results. A large-scale analyses of the high pressure turbine-strut-low pressure turbine were also carried out, and it was confirmed that a reasonable solution could be obtained.

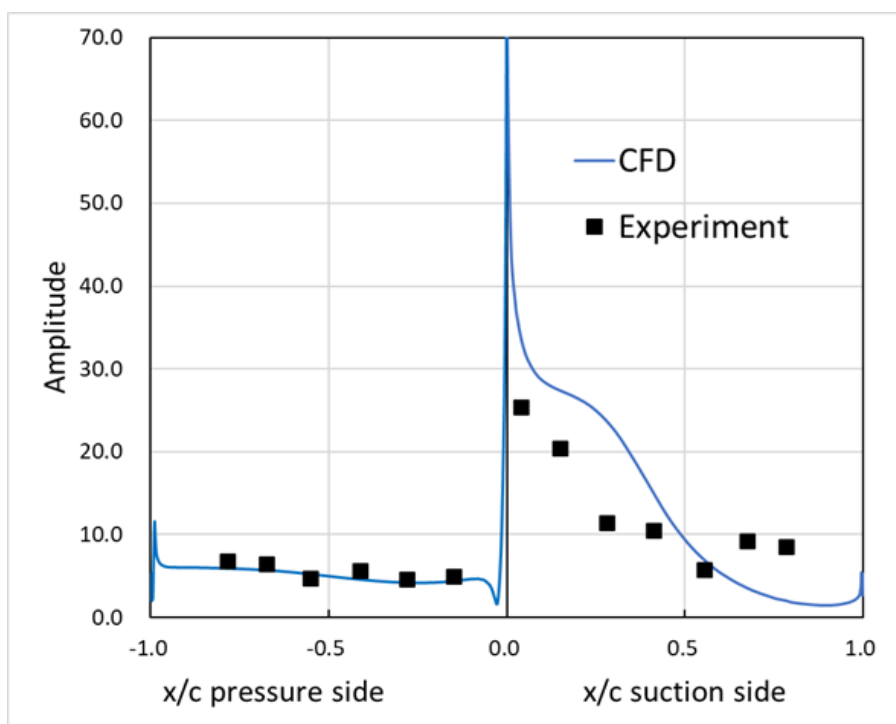


Fig. 1: Unsteady pressure distribution on the blade surface in cascade flutter analysis (amplitude)

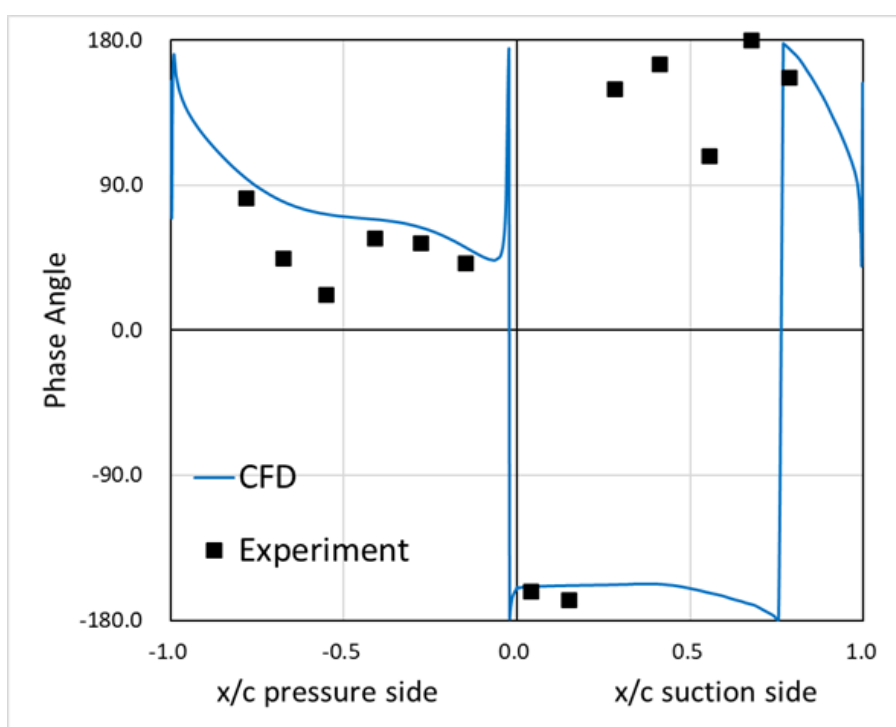


Fig. 2: Unsteady pressure distribution on the blade surface in cascade flutter analysis (phase)

- **Publications**

N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	936 - 972
Elapsed Time per Case	11300 Second(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources*1(%): 0.21

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	4,496,849.36	0.21
TOKI-ST	373,156.44	0.38
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.43	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	0.39	0.00
/data and /data2	5,793.55	0.03
/ssd	0.00	0.00

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage* ² (%)
J-SPACE	11.64	0.04

*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)	290.90	0.20

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