

## Structural Analysis of Low Pressure Turbine

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### ● Abstract

The purpose of aFJR project is to advance research on jet engine component technologies so that Japanese manufacturers can join more effectively in international joint-development projects on next-generation jet engines. Application of a Ceramic Matrix Composite (CMC) to low pressure turbine blade material is conducted to reduce the engine weight in the aFJR project.

<http://www.aero.jaxa.jp/eng/research/ecat/afjr/>

### ● Reasons for using of JSS2

The CMC low pressure turbine blade was designed based on the analysis results using JSS2. The CMC blade design methodology was demonstrated experimentally.

### ● Achievements of the Year

Figure shows the fracture analysis result of the cascade of CMC low pressure turbine blades at the moment of contact with the cascade of stator vanes. The fracture mode of the cascade of CMC blades could be analyzed.



Fig.1 The fracture analysis of the cascade of CMC blades

#### ● Publications

- Non peer-reviewed papers

1) J. Kitagawa, S. Fukushige, T. Yoden, M. Hojo, Development of Impact Fracture Model of Ceramics Matrix Composite based on Impact Tests, 68th Aeroballistic Range Association Meeting, (2017), CA.

● Usage of JSS2

● Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	128 - 256
Elapsed Time per Case	200.00 hours

● Resources Used

Fraction of Usage in Total Resources\*1 (%): 0.69

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	5,256,874.22	0.70
SORA-PP	0.00	0.00
SORA-LM	11,859.73	6.11
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	201.86	0.14
/data	56,935.97	1.05
/ltmp	9,440.11	0.71

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	6.93	0.30

\*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