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

● **Responsible Representative**

Takashi Aoyama, Aeronautical Technology Directorate, Numerical Simulation Research Unit

● **Contact Information**

Kanako Yasue(yasue.kanako@jaxa.jp)

● **Members**

Shunji Enomoto, Junichi Kazawa, Atsushi Hashimoto, Takashi Ishida, Shigeru Kuchiishi, Mitsumasa Makida, Hiroki Ugajin, Taisuke Nambu, Keiji Ueshima, Kanako Yasue, Takashi Aoyama

● **Abstract**

Unstructured-grid flow solver FaSTAR-Move and grid generator BOXFUN are applied to aero-engine elements 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**

The linear cascade (T106A) with cooling holes was analyzed using the FaSTAR-Move, and the computational results were compared with the experimental ones.
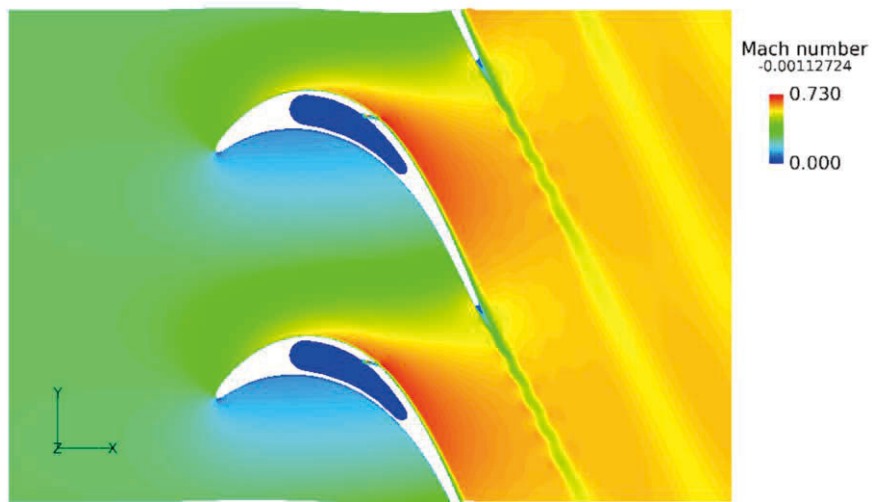
Fig. 1: Mach number distribution of the linear cascade (T106A) with cooling holes.
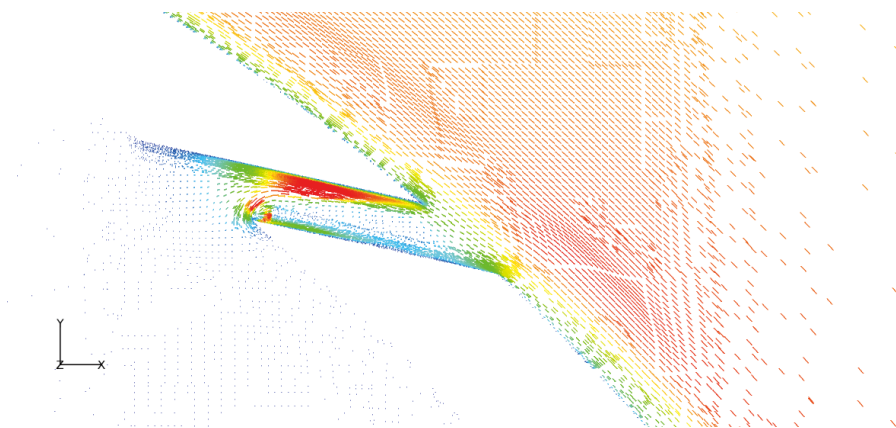

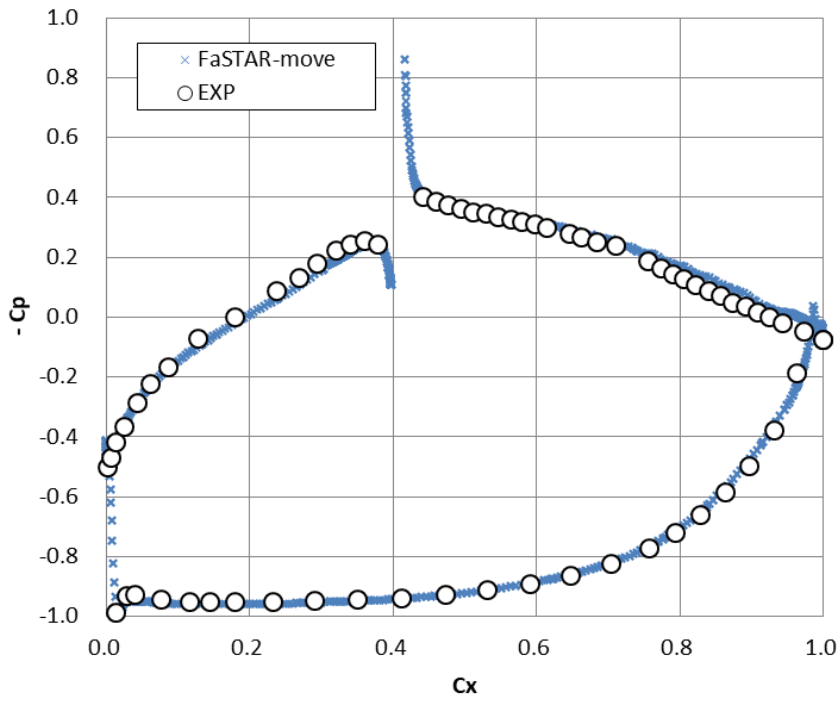Fig. 2: Velocity vector distribution near the cooling hole.

Fig. 3: Static pressure distribution on the blade surface

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	64
Elapsed Time per Case	10 Hour(s)

● **Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.36

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2](%)
SORA-MA	2,976,884.96	0.36
SORA-PP	31,404.87	0.20
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	181.18	0.15
/data	21,530.18	0.37
/ltmp	4,365.50	0.37

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	10.59	0.27

[*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.