Innovative Green Aircraft Technology : High Efficiency and Low Noise Aircraft

● **Responsible Representative**

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● **Abstract**

The purpose of the iGreen research is to develop and mature a bunch of advanced and innovative technologies on aerodynamics, aeroacoustics, and structures to enable airframe design with higher environmental performances. In addition to verifying practical application of these technologies, we will also work on the development of elemental and system technologies.

Ref. URL: https://www.aero.jaxa.jp/eng/research/ecat/igreen/

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

CFD analysis are used for the understanding of aerodynamic characteristics and evaluation of the performance in the aircraft design phase. Huge calculation resources and costs were required for the high fidelity and quick response CFD analysis for the optimum aerodynamic design process on complex aircraft geometry. JSS3 can achieve those requirements, the cost and time are drastically saved on the CFD analysis.

● **Achievements of the Year**

Collaborative research activities with universities have been conducted for aerodynamic technologies to improve the environmental performances of subsonic aircraft such as low fuel consumption and low noise. In this year, aerodynamic design of anti-contamination devices(ACD) on the laminar wing, the boundary-layer transition control by surface temperature controlling were conducted on swept wings. On design of aerodynamic devices to prevent the boundary layer attachment-line contamination, the guideline for aerodynamic geometry design including the height were proposed, as well as, original geometry of ACD which can be effctively prevent the attachment-line contamination were designed.

● **Publications**

- Oral Presentations

Nozomu HAYABE, Keisuke OHIRA and Dongyoun KWAK : Guidelines and criteria towards for the design of Anti-Contamination Device for laminar flow wings, 2022 Asia-Pacific International Symposium on Aerospace Technology,   Niigata, Japan, 12-14 Oct, 2022.

Yohsuke Matsuda, Dongyoun Kwak : A Study of Boundary-Layer Transition Control by surface temperature Controlling on the Swept Wing, 2022 Asia-Pacific International Symposium on Aerospace Technology, Niigata, Japan, 12-14 Oct, 2022.

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	64 - 1024
Elapsed Time per Case	10 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.13

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	2,964,019.33	0.13
TOKI-ST	95,606.90	0.10
TOKI-GP	0.00	0.00
TOKI-XM	1.99	0.00
TOKI-LM	1,775.00	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	477.28	0.43
/data and /data2	31,636.62	0.24
/ssd	461.04	0.06

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[2] (%)
J-SPACE	7.60	0.03

[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)	2,199.72	1.53

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