Research on Airframe-Proplusion Integration Design Technology

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Abstract

The purpose of the research is to obtain airframe-proplusion integration design technology to enable airframe design with higher environmental performances of future aircraft application.

Reasons and benefits of using JAXA Supercomputer System

To obtain airframe-proplusion integration design technology to enable airframe design with higher environmental performances of future aircraft application, CFD-based design/analyis have been conducted in this research. The high-fidelity CFD analysis of the whole aircraft configurations with the airframe-engine installation requires large computational resources. JSS enables the high-fidelity evaluations of the peformance in a timely manner and the technology developments.

Achievements of the Year

Based on specifications from the conceptual design for a 220-seat BWB with hydrogen-electric distributed engines, the wing-body design was performed. A BWB wing-body configuration that achieves the target lift distribution was successfully obtained.

Fig. 1: Image of 220-seat BWB with hydrogen-electric distributed engines

- **Publications**

  N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	2880
Elapsed Time per Case	10 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	5,337,373.28	0.24
TOKI-ST	5,278.44	0.01
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	841.57	0.06
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	196.27	0.13
/data and /data2	22,352.43	0.11
/ssd	2,091.67	0.11

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	14.29	0.05

*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)	45.38	0.03

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