Research and development of CFD-based flight simulator

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Abstract

In aircraft certification, fight-test risk-reduction and cost-reduction are issues. CbA (Certification by Analysis), which replaces flight tests with analysis, is being studied globally in order to promote safe and efficient certification. Therefore, we are constructing a CFD-based flight simulator for the purpose of replacing and complementing flight tests.

Reasons and benefits of using JAXA Supercomputer System

In order to build a CFD-based flight simulator, it is necessary to execute a large number of calculation cases with different Mach numbers, angles of attack, rudder angles, etc., and create an aerodynamic database.

Achievements of the Year

We conducted 169 cases steady CFD simulation by FaSTAR to improve the accuracy of the aerodynamic data base for the simulator. Various combinations of stabilizer angle, flap deflection angle, and flight conbination brings us pieces of insight that help us to improve the prediction accuracy of the piching moment. This FY result contribute to accurate CFD-based flight simulator.

Publications

N/A

Usage of JSS

Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	512
Elapsed Time per Case	30 Hour(s)

JSS3 Resources Used

Fraction of Usage in Total Resources[*1](%): 0.46

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	12,418,241.75	0.54
TOKI-ST	13,604.10	0.01
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	1,349.62	0.09
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	1,341.36	1.21
/data and /data2	121,447.02	0.94
/ssd	31,382.70	4.35

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	37.32	0.17

*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)	171.72	0.12

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