Research and development of basic technologies for building conceptual design frameworks

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Abstract

This research aims to enable aircraft operators to make appropriate business decisions ahead of market changes in new aircraft markets, including the rapidly changing unmanned aircraft market, by making it easier to understand aircraft performance and to develop or select aircrafts that match the market, especially in the initial phase of business.

Reasons and benefits of using JAXA Supercomputer System

JSS3 was chosen because it requires multiple parallel calculations because it involves calculations around rotating propellers, and because the high-speed fluid calculation program FaSTAR-Move is also optimized.

Achievements of the Year

The flow around a rotating propeller for commercially available model electric aircraft was computed by CFD analysis, and the thrust coefficient and power coefficient were obtained. It is expected to be used as reference data for flight tests and wind tunnel tests.

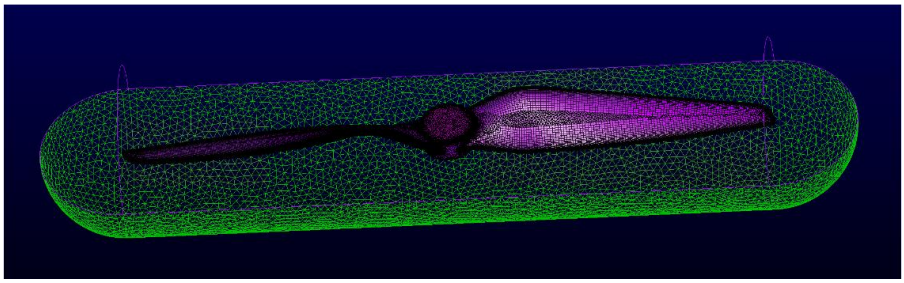

Fig. 1: On surface and near surface computational grid.

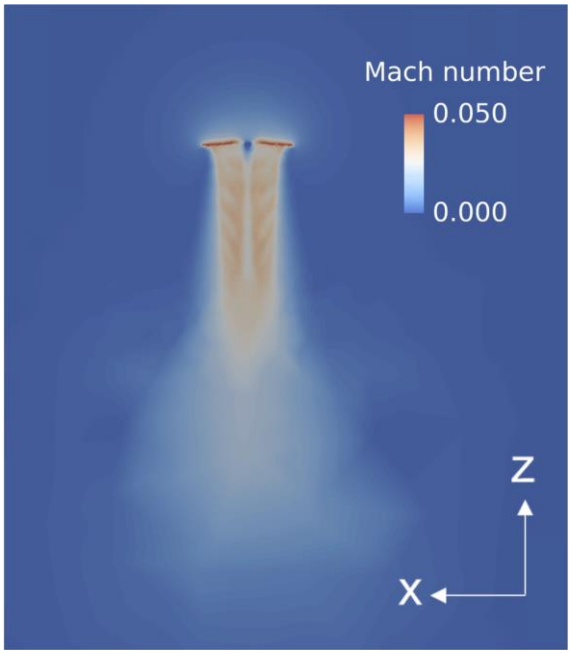

Fig. 2: Velocity distributiona after 30 rotations.

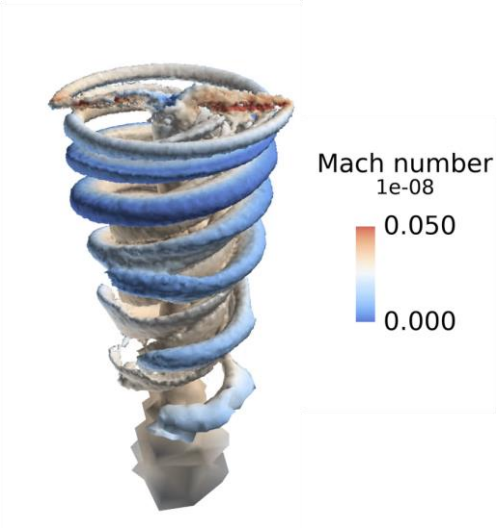

Fig. 3: Q-value distribution after 30 rotasions.

- **Publications**

  N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	480 - 1440
Elapsed Time per Case	196 Hour(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.03

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	737,643.47	0.03
TOKI-ST	2,481.46	0.00
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
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	1,113.44	0.92
/data and /data2	127,302.22	0.79
/ssd	30,720.00	2.90

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	19.63	0.07

[*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)	260.41	0.12

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