Research of numerical prediction for the flight stability

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Abstract

The flight stability of aircraft is necessary to establish safe flight. We aim to improve the technology level of flight stability prediction through numerical simulation. The numerical method is validated and analyzed for developing better numerical tools.

Reasons and benefits of using JAXA Supercomputer System

Unsteady simulations required for the stability analysis demand large computational resources and produce much data. JSS allows us to simulate and analysis of numerical results.

Achievements of the Year

We conducted several unsteady numerical simulations with forced roll oscillation to analyze roll instability of a high-mobility aircraft. The Spalart-Allmaras model is used as a turbulence model. The time-averaged surface streamlines in experimets and the simulations suggest that the current simulation well predict the characteristic phenomenon that appears in the roll instability.

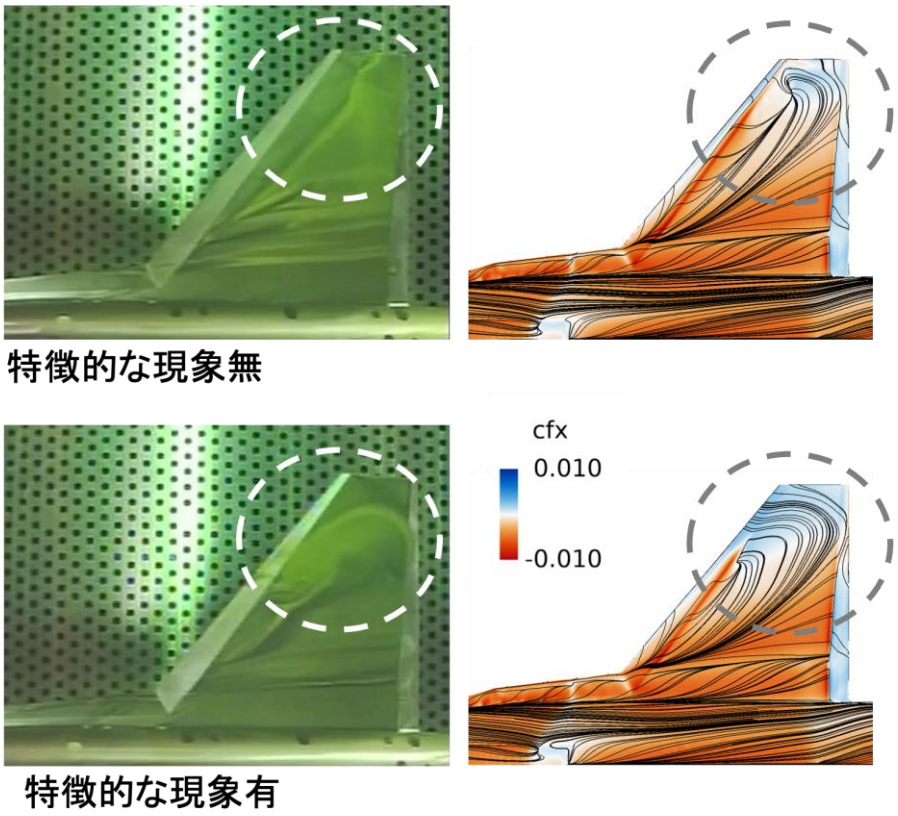

Fig. 1: Surface streamlines in experiments and numerical simulations

- **Publications**

  N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	1152 - 3456
Elapsed Time per Case	300 Hour(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.57

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	15,583,474.19	0.68
TOKI-ST	4,501.90	0.00
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	3,384.22	0.23
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	63.19	0.06
/data and /data2	26,853.15	0.21
/ssd	574.24	0.08

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	34.00	0.15

[*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)	62.56	0.04

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