Cooperative Research: unsteady flow simulation with unstructured-grid CFD code

Report Number: R19EA3210
Subject Category: Aeronautical Technology
URL: https://www.jss.jaxa.jp/en/ar/e2019/11532/

Responsible Representative

Takashi Aoyama, Aeronautical Technology Directorate, Numerical Simulation Research Unit

Contact Information

Atsushi Hashimoto, Aeronautical Technology Research Unit, Numerical Simulation Research Unit(hashimoto.atsushi@jaxa.jp)

Members

Atsushi Hashimoto, Takashi Ishida, Hideaki Sugawara, Keiji Ueshima, Minoru Yoshimoto, Takuya Ogura, Shinsuke Nishimura, Yukinori Morita, Kazuhiro Imai, Kei Nakanishi, Shigeru Kuchiishi, Takashi Aoyama, Kanako Yasue

Abstract

In order to simulate unsteady separated flow phenomena, we validate an unstructured-grid CFD code for practical problems and identify problems that have to be solved.

Reasons and benefits of using JAXA Supercomputer System

JSS2 is indespensable to accelerate the validation of unsteady flow simulations.

Achievements of the Year

A separated flow at the leading edge of delta wing is simulated with steady and unsteady computaion of FaSTAR and compared with experimental data (Chu&Lucking, NASA-TM-4645, 1996). Figure 1 shows a steady computation result as an example, which is computed at Mach number of 0.85, Reynolds number of 6x10^6, angle of attack of 20.6deg. The pressure distributions on the upper surface of delta wing agree well with the experimental data.

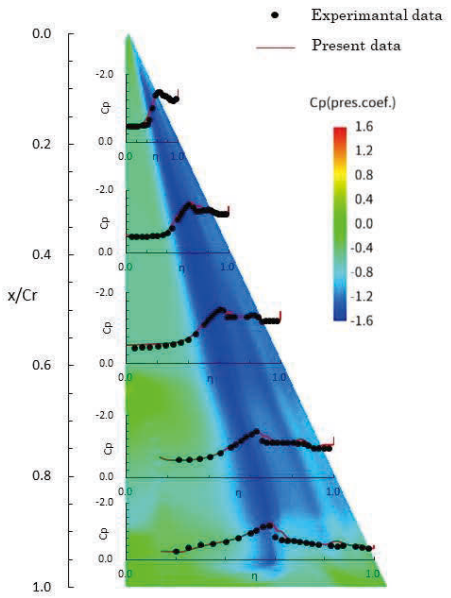

Fig. 1: Pressure distribution on upper surface of delta wing

Publications

N/A

Usage of JSS2

Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	256 - 512
Elapsed Time per Case	100 Hour(s)

- **Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.10

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2](%)
SORA-MA	811,012.37	0.10
SORA-PP	224.65	0.00
SORA-LM	2,468.31	1.03
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	295.53	0.25
/data	26,925.10	0.46
/ltmp	4,075.53	0.35

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	0.52	0.01

[*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.