Multivariate time series data analysis

Report Number: R24EDA201N04
Subject Category: Aeronautical Technology
URL: https://www.jss.jaxa.jp/en/ar/e2024/27182/

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Abstract

Due to recent advancements in computing, numerical analysis, and experimental techniques, vast amounts of data are being produced, making advanced data analysis methods increasingly important. In this study, we are developing tools to automatically extract latent characteristic structures from the large datasets obtained through unsteady fluid simulations and experiments.

Reasons and benefits of using JAXA Supercomputer System

To perform large-scale data analysis utilizing the large memory capacity and massively parallel simulations.

Achievements of the Year

Large-scale CFD computational data on the transonic buffet phenomenon were analyzed, and the effectiveness of data analysis methods for non-periodic and intermittent phenomena was verified. In addition, CFD computations were performed to reproduce the characteristic spatiotemporal patterns occurring in the wake behind a blunt object.

Publications

- Oral Presentations

Yuya Ohmichi, Lusher David, Sansica Andrea, Unsteady Fluid Dynamics Analysis Using Variational Mode Decomposition for the Separation Phenomenon Accompanying Shock-Wave Oscillation, 38th CFD Symposium, OS4-2-7-03, 2024.

Usage of JSS

Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	1 - 144
Elapsed Time per Case	12 Hour(s)

JSS3 Resources Used

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

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	2,635,586.85	0.12
TOKI-ST	1,050.26	0.00
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	2,319.89	0.17
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	324.11	0.22
/data and /data2	54,238.00	0.26
/ssd	0.00	0.00

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	3.51	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.

- **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage*2 (%)
ISV Software Licenses (Total)	1.62	0.00

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