

Study on multi-dimensional time series data analysis

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● Abstract

Knowledge extraction techniques for large data sets are important because the computers and numerical simulation techniques have been highly developed and they produced massive datasets. In this study, we have been developing knowledge extraction tools which extract patterns from large data sets obtained by unsteady fluid simulations.

● Reasons for using JSS2

Large amount of memory is necessary for performing the developed knowledge extraction tools.

● Achievements of the Year

Using the proposed method for unsteady flow data analysis, we identified several dominant fluid structures in the wake of an atmospheric entry capsule, and quantitatively clarified the aerodynamic forces caused by the fluid structures.

● Publications

- Oral Presentations

1) Yuya Ohmichi, Kenji Kobayashi, Masahiro Kanazaki, "Feature extraction technique for large time-series data and its application to wake flow analysis of a re-entry capsule," 50thFDC/36thANSS, July 2018.

2) Yuya Ohmichi, "Dynamic Mode Decomposition for Unsteady Fluid Data Analysis," 35th Annual Meeting of The Japan Society of Plasma Science and Nuclear Fusion Research, December 2018.

- Other

Yuya Ohmichi, Yasuhiko Igarashi, "Dynamic Mode Decomposition for Multi-dimensional Time Series Analysis," Vol. 25, 1, pp. 2-9, 2018.

● Usage of JSS2

● Computational Information

Process Parallelization Methods	N/A
Thread Parallelization Methods	OpenMP
Number of Processes	1
Elapsed Time per Case	72 Hour (s)

● Resources Used

Fraction of Usage in Total Resources*1 (%): 0.09

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	685,086.01	0.08
SORA-PP	4,638.84	0.04
SORA-LM	5,300.77	2.47
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	278.16	0.29
/data	5,696.62	0.10
/ltmp	1,139.32	0.10

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	7.04	0.25

*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.