

Modal decomposition analysis of a flow field around a re-entry capsule

Report Number : R17ECMP20

Subject Category : Competitive Funding

URL : <https://www.jss.jaxa.jp/ar/e2017/4434/>

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● Abstract

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

● Reasons for using of JSS2

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

● Achievements of the Year

A numerical tool to conduct dynamic mode decomposition and compressed sensing techniques was developed. The tool was applied to a flow field around a re-entry capsule and we found a novel fluid phenomenon that had very long time scale.

● Publications

● Peer-reviewed papers

- 1) Y. Ohmichi, Preconditioned dynamic mode decomposition and mode selection algorithms for large datasets using incremental proper orthogonal decomposition, AIP Advances, 7(7), 075318, 2017.

● Usage of JSS2

● Computational Information

Parallelization Methods	N/A
Thread Parallelization Methods	OpenMP
Number of Processes	1
Elapsed Time per Case	72.00 hours

● Resources Used

Fraction of Usage in Total Resources*1 (%): 0.04

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	24,711.62	0.00
SORA-PP	129.30	0.00
SORA-LM	1,051.62	0.54
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	397.36	0.28
/data	48,990.91	0.91
/ltmp	1,627.60	0.12

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	15.20	0.65

*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