

Development of fluid analysis system for turbomachinery using CFD software named UPACS

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● Abstract

For turbo machines including centrifugal compressors, a software package will be developed to analyze flow phenomena in more detail by utilizing JAXA's fluid analysis technologies.

● Reasons and benefits of using JAXA Supercomputer System

To analyze the detailed flow field around turbo machines, it is necessary to confirm the prediction accuracy of the analysis by DES. For this purpose, a large-scale analysis will be performed in various flow conditions, so it cannot be performed without JSS2.

● Achievements of the Year

It was confirmed that the flow field around the centrifugal compressor could be analyzed by DES using UPACS. In addition, we analyzed the flow field around the centrifugal compressor with up to 800 million grids and confirmed that there was no problem with parallelization performance of UPACS.

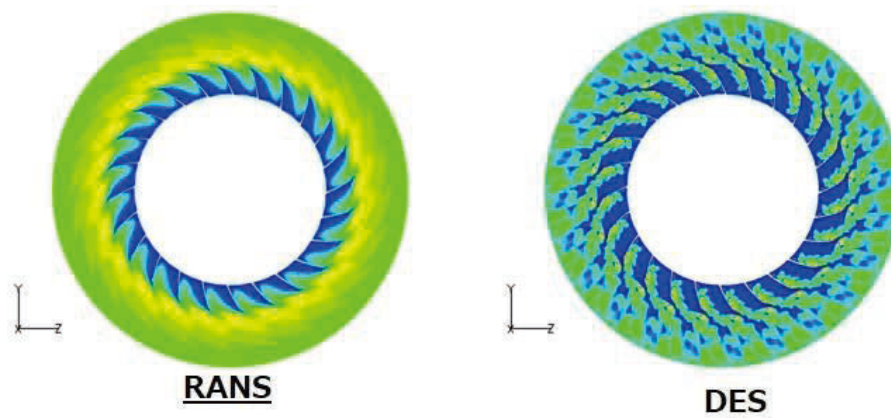


Fig. 1: Flow Fields around the centrifugal compressor (Entropy Distribution, left:RANS, right:DES)

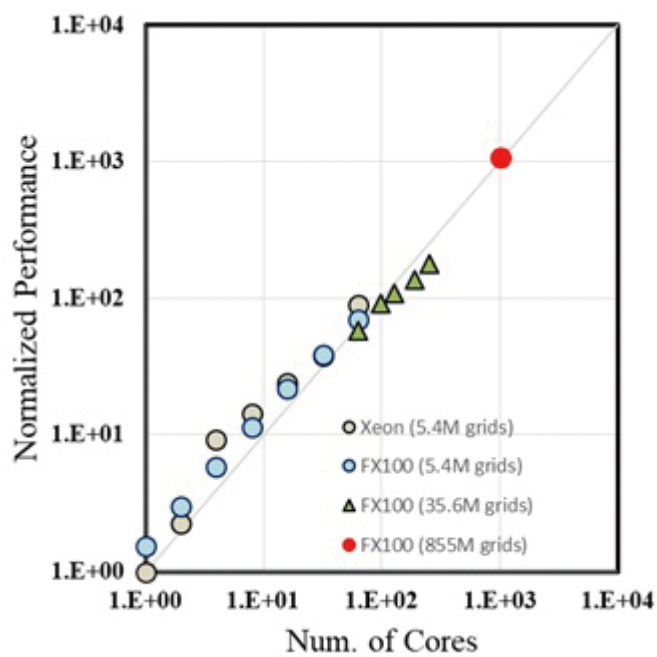


Fig. 2: parallelization performance of UPACS

● Publications

N/A

● Usage of JSS2

● Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	Automatic Parallelization
Number of Processes	64 - 1024
Elapsed Time per Case	12 Hour(s)

- **Resources Used**

Fraction of Usage in Total Resources*1(%): 0.03

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
SORA-MA	91,954.74	0.01
SORA-PP	0.00	0.00
SORA-LM	0.00	0.00
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	128.60	0.11
/data	14,937.85	0.26
/tmp	3,110.91	0.26

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	119.34	3.00

*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.