Development of 3D CFD core-software of automotive engine combustion chamber

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Abstract

Enhancement of CAE utilization in automotive engine research by developing an engine combustion simulation software that is sharable in Japan automotive research community.

Reasons and benefits of using JAXA Supercomputer System

Massive-parallel large scale simulation, Large number of simulations fo software validation

Achievements of the Year

In order to make HINOCA a more practical software, the following five themes have been set for this fiscal year to further improve its functions as a platform. "Improvement of conservation", "Addition of geometry definition function", "Addition of coupled calculation function", "Addition of reaction function", "Improvement of I/O function".

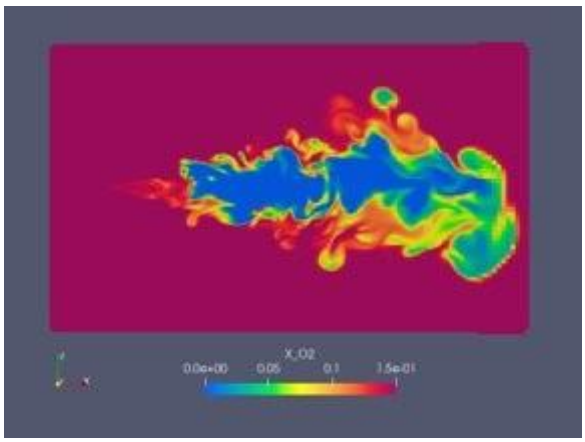

Fig. 1: Analysis results of spray combustion using advanced reaction calculation methods

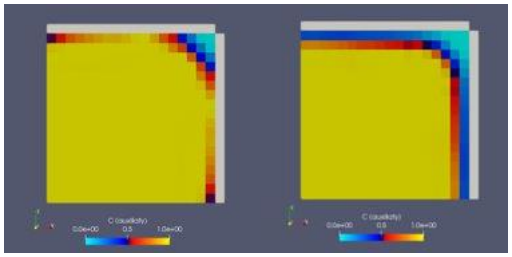

Fig. 2: Differences in flame propagation calculation results with and without flame quenching model (left: without flame quenching model, right: with flame quenching model)

- **Publications**

  N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	1 - 2048
Elapsed Time per Case	168 Hour(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.69

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	17,608,305.61	0.77
TOKI-ST	298,269.50	0.30
TOKI-GP	0.00	0.00
TOKI-XM	39.06	0.02
TOKI-LM	3,591.01	0.24
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	435.60	0.39
/data and /data2	488,164.70	3.77
/ssd	3,090.87	0.43

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	40.88	0.18

[*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)	218.30	0.15

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