

Numerical analysis on atomization and spray combustion

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● Abstract

A numerical study is performed to clarify phenomena on atomization and spray combustion.

● Reasons and benefits of using JAXA Supercomputer System

Phenomena on atomization and spray combustion require a high calculation load, and the use of super computer is necessary.

● Achievements of the Year

Numerical simulations were performed to investigate combustion instabilities on a coaxially-staged lean-burn fuel injector.

A new model of fuel-supply response to oscillating air flows was under development, and a preliminary result with the model was compared to that with the conventional one. An example of such results is shown in Figure 2.

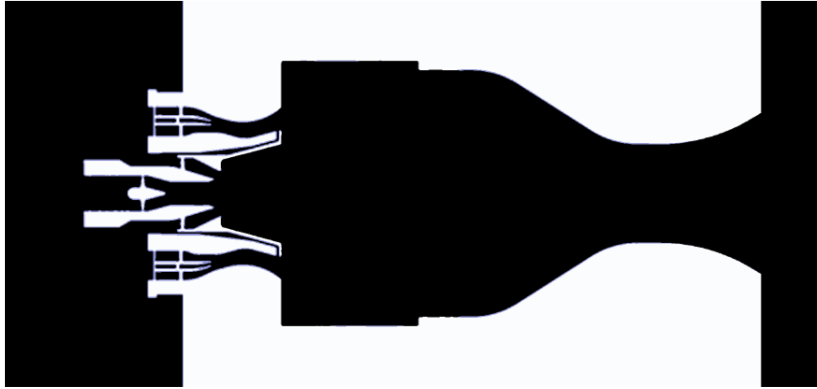
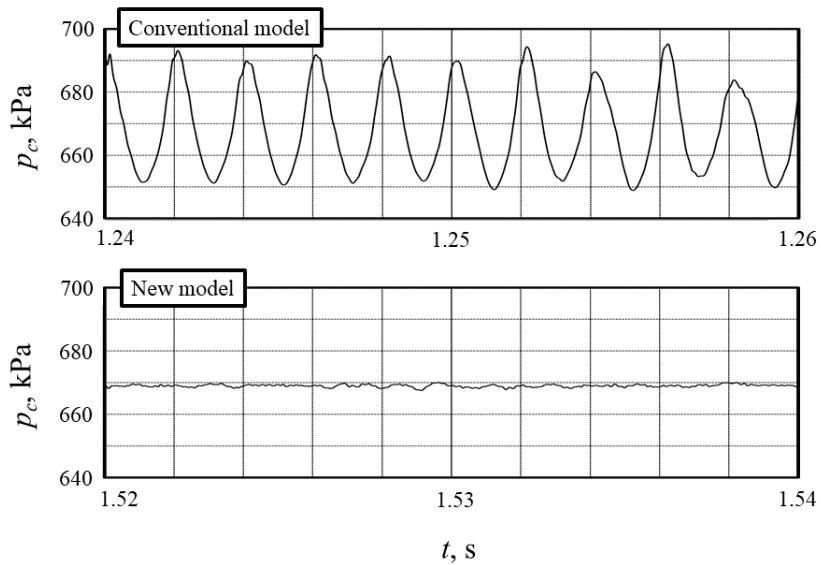


Fig. 1: Major part of numerical mesh for the combustor.



Courtesy of Prof. Kurose of Kyoto Univ. for technical advice on CFD method

Fig. 2: Time evolution of pressure at a monitoring position in the combustion chamber.

● Publications

N/A

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	512
Elapsed Time per Case	120 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources*1(%): 0.90

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	24,054,705.73	1.09
TOKI-ST	117,804.79	0.13
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	860.89	0.07
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	235.83	0.20
/data and /data2	30,052.50	0.19
/ssd	0.00	0.00

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage* ² (%)
J-SPACE	0.09	0.00

*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.

● **ISV Software Licenses Used**

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

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