Development of CFD technology to support design of aircraft combustor with real configuration.

● **Responsible Representative**

Takashi Yamane, Aeronautical Technology Directorate, Propulsion Research Unit

● **Contact Information**

Mitsumasa Makida　makida.mitsumasa@jaxa.jp

● **Members**

Mitsumasa Makida(JAXA), Naoki Nakamura(ASIRI)

● **Abstract**

In this research, we aim to obtain design methods for development of aircraft combustors with real configuration, which estimate dispersion of the fuel droplets, evaporation, and combustion processes.

● **Reasons for using of JSS2**

It is important to do parametric case study with slightly different geometry, and each case with spray and combustion needs large scale simulation. To conduct such simulation and visualization effectively, we use the super computer with high parallelization efficiency.

● **Achievements of the Year**

In this fiscal year, we integrate real gas effect, fuel evaporation and chemical reaction model into the base solver, which enabled to simulate the distribution of fuel spray, fuel vapor and chemical reaction rate near the fuel nozzle with realistically complicated configuration.
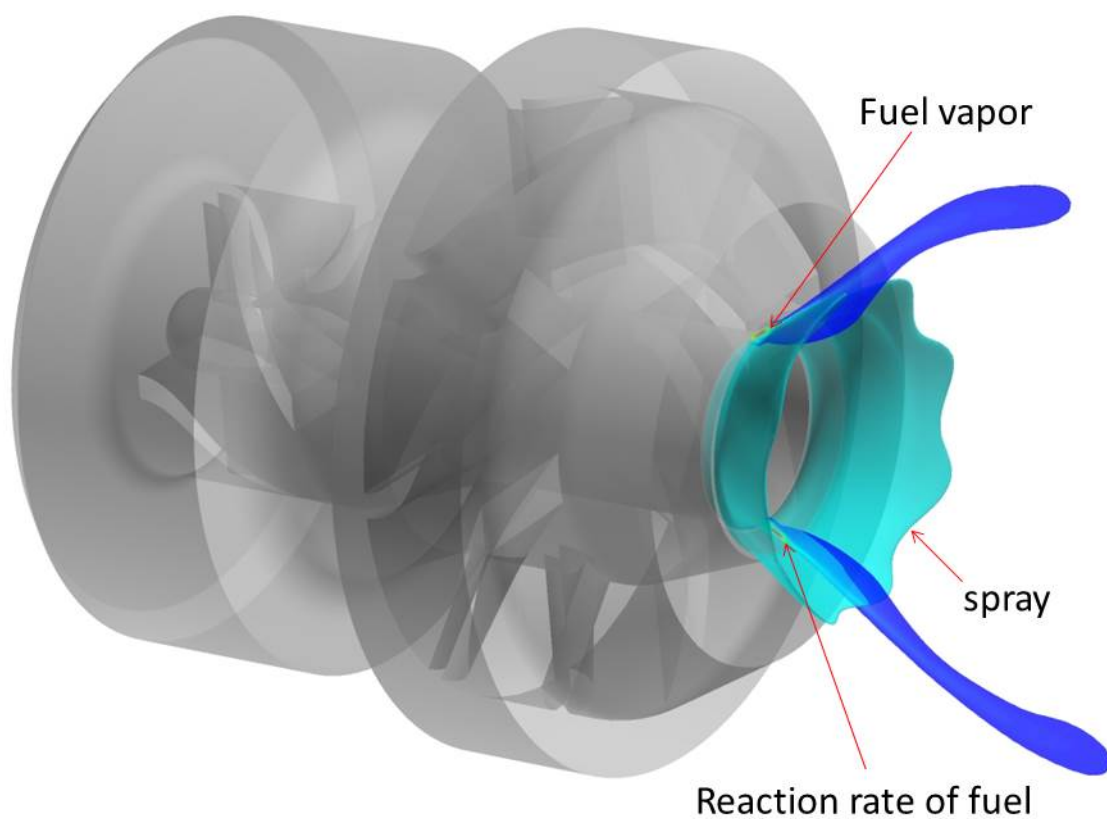
Fig.1 Disrtibution of fuel spray, fuel vapor and reaction rate near fuel nozzle

● Publications

N/A

🔵 Usage of JSS2

● Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	Automatic Parallelizatio
Number of Processes	120
Elapsed Time per Case	300.00 hours

● Resources Used

Fraction of Usage in Total Resources*1 (%): 0.31

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	2,536,622.63	0.33
SORA-PP	4,300.70	0.05
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	211.66	0.15
/data	9,391.05	0.17
/ltmp	1,519.10	0.11

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	0.14	0.01

*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