

## Noise suppression technology for aircraft jet engines

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Subject Category: Aeronautical Technology

URL: <https://www.jss.jaxa.jp/en/ar/e2018/9062/>

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### ● Abstract

Noise generated from a jet engine is dominant to total aircraft noise level and it is very important to reduce this. In this project, demonstration of exhaust noise reduction by changing exhaust duct shape, and study of noise reduction technique by numerical analysis were carried out.

Ref. URL: <http://www.aero.jaxa.jp/eng/research/ecat/greenengine/>

### ● Reasons for using JSS2

The calculation was LES with a large amount of computation and storage usage. It was necessary to use SORA-PP and SORA-FS.

### ● Achievements of the Year

In order to investigate the behavior of sound waves passing through a jet, LES calculation of the jet was performed using UPACS-LES. The incident sound wave travels across the jet. In this year, to approximate the experimental shape, a rectangular jet was calculated. Figure 1 shows the iso-Mach number plane of the jet. Fig. 2 shows the sound pressure distribution of the cross section. Reflection and shielding of incident sound occurred in the jet downstream direction. Fig. 3 shows the phase of the incident sound. As the sound passes through a jet, the wavefront is slightly flowing downstream.

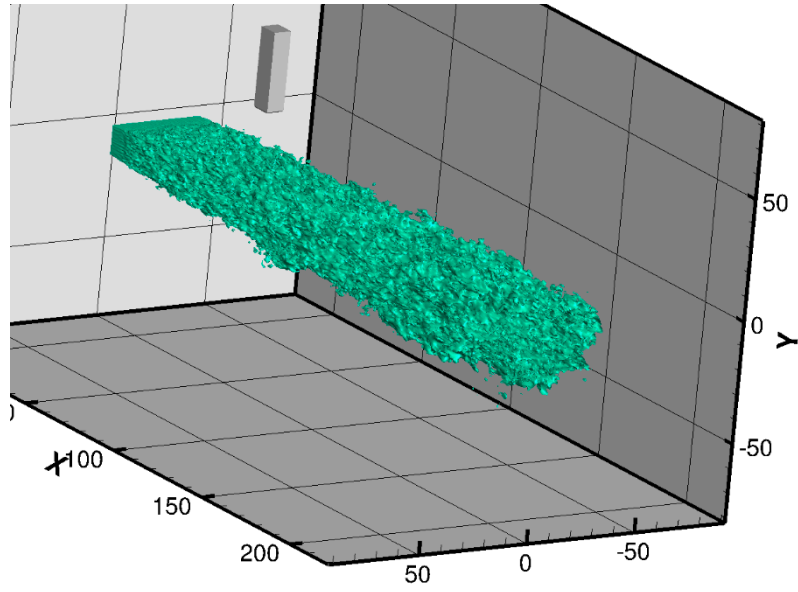


Fig. 1: Iso Mach number surface and speaker position of the rectangular jet

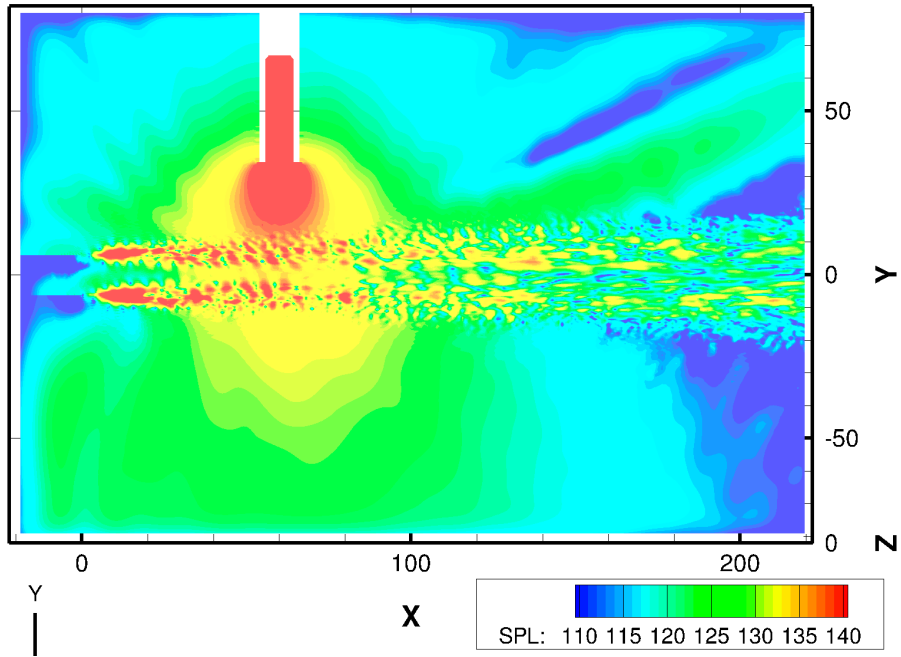


Fig. 2: Sound pressure level of sound emitted from the speaker

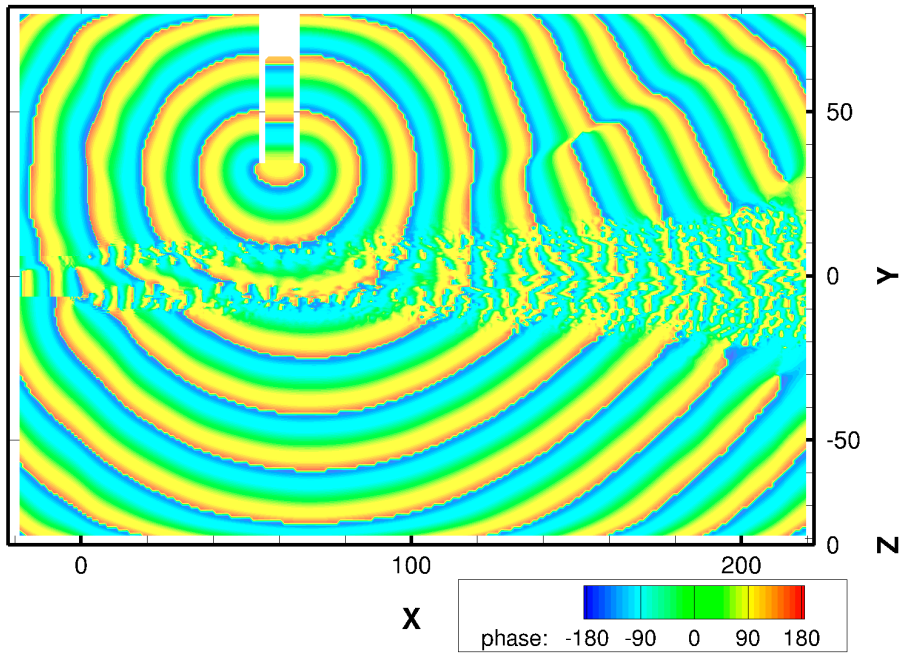


Fig. 3: Phase of sound emitted from the speaker

● **Publications**

- Non peer-reviewed papers

Kae Ito, Tatsuya Ishikawa, Jin Ishikawa, “Experimental study on high frequency sound shielding by jet”, S0510405, The Accual meeting 2018, The Japan Society of Mechanical Engineers

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	60
Elapsed Time per Case	10 Hour (s)

● **Resources Used**

Fraction of Usage in Total Resources\*1 (%): 0.32

## Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	13,656.46	0.00
SORA-PP	194,197.00	1.55
SORA-LM	0.00	0.00
SORA-TPP	219,399.05	16.05

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	30.35	0.03
/data	2,173.70	0.04
/ltmp	4,539.54	0.39

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	11.28	0.39

\*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.