

Study on Acoustic Analysis Techniques to Improve Aerospace Interior Acoustic Environment

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● Responsible Representative

Takashi Aoyama, Aeronautical Technology Directorate, Numerical Simulation Research Unit

● Contact Information

Takashi Takahashi takahashi.takashi@jaxa.jp

● Members

Takashi Takahashi, Yuya Ohmichi, Masashi Kanamori, Takahiro Higash, Kento Yamada,
Kan Ohkubo, Tatsuya Narumi

● Abstract

We study the numerical prediction approaches of sound sources, propagation and transmission for practical aerospace applications (e.g. aircraft interior noise prediction, etc.). Our aim is to upgrade the respective technologies in order to attain the world's most advanced high speed and sophistication levels, and to develop an integrative numerical prediction tool that accommodates the seamless application of technologies.

● Reasons for using of JSS2

In order to accurately reproduce to characteristics of jet noise, a calculation grid need to resolution enough to capture small fluid phenomena. Therefore, the number of grid points used for acoustic analysis is very large, and it is necessary to use a computer capable of large scale parallelization to perform calculations.

● Achievements of the Year

The noise generated from subsonic jet was analyzed by CFD. Analysis was performed on two kinds of nozzle shapes(Fig.1), and frequency characteristics of each noise were evaluated. Flow field analysis used the unstructure analysis solver FaSTAR. From the analysis results, it was possible to confirm the difference in vortex structure due to the difference nozzle shape (Fig.2). From the analysis result of the noise, the frequency distribution close to the experimental value can be reproduced in the low frequency.

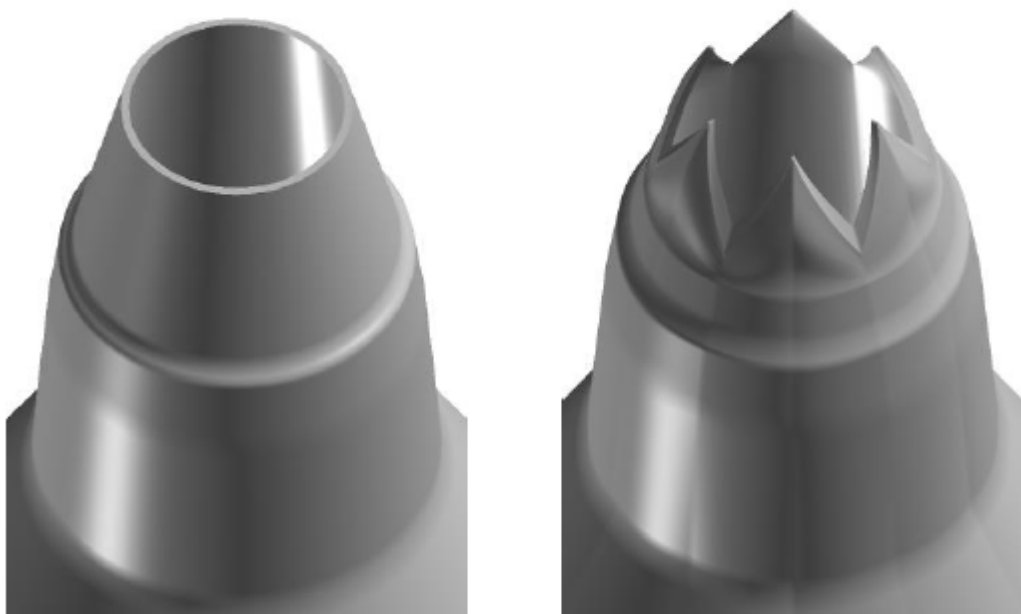


Fig.1 Picture of nozzle geometry

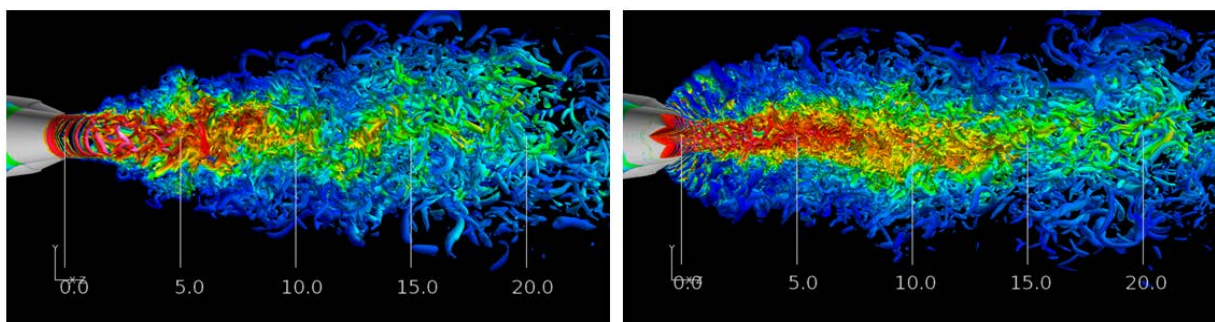


Fig.2 Vortex structure of each nozzles

● Publications

N/A

● Usage of JSS2

● Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	2 - 800
Elapsed Time per Case	30.00 hours

● Resources Used

Fraction of Usage in Total Resources*1 (%): 0.38

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	2,834,770.96	0.38
SORA-PP	8,270.53	0.10
SORA-LM	1,955.61	0.01
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	1,603.54	1.11
/data	37,329.55	0.69
/ltmp	9,393.61	0.71

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	9.50	0.41

*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