FQUROH-A: CFD Code Modifications

Report Number: R21EDA101R29 Subject Category: Aeronautical Technology URL: https://www.jss.jaxa.jp/en/ar/e2021/18543/

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Abstract

In order to meet the projected demand for air passengers, and to strengthen the international competitiveness of Japan airports and improve the convenience of passengers, major airports are considering increasing the number of takeoffs and landings. The maturity of the technology for the reduction of airframe noise generated at high-lift devices and landing gear needs to be increased to achieve noise reduction in areas surrounding airports even with the expected increased number of takeoffs and landings. In this project, we have been developing a flight test plan using a commercial airplane that demonstrates the reduction of airframe noise as part of activities aimed at practical development of the airframe noise reduction technology. Computational simulations have been utilized to verify the feasibility of practical noise reduction concepts and design methods.

In this work, operation check and debug of the modified CFD code on JSS is conducted.

Ref. URL: http://www.aero.jaxa.jp/eng/research/ecat/fquroh/

Reasons and benefits of using JAXA Supercomputer System

The JSS is used to understand detailed physics of noise generation, and to optimize noise reduction designs. The FQUROH-A Research aims to accelerate technology maturity of airframe noise reduction methods using advanced high-fidelity computational simulations on the JSS's high performance computing platform and to demonstrate the high-fidelity design technologies through flight tests. Computational simulations using the JSS make it possible to design low-noise devices by understanding detailed physical phenomena, which is difficult to obtain only with wind tunnel tests.

Achievements of the Year

The pre-processing and flow solver in the CFD code were modified with debuging through application to a large scale practical problem on JSS.

Publications

N/A

Usage of JSS

• Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	1 - 300
Elapsed Time per Case	10 Hour(s)

• JSS3 Resources Used

Fraction of Usage in Total Resources^{*1}(%): 0.01

Details

Computational Resources				
System Name	CPU Resources Used (core x hours)	Fraction of Usage ^{*2} (%)		
TOKI-SORA	54,990.67	0.00		
TOKI-ST	23,644.94	0.03		
TOKI-GP	0.00	0.00		
TOKI-XM	0.00	0.00		
TOKI-LM	0.00	0.00		
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	52.80	0.05	
/data and /data2	53,984.08	0.58	
/ssd	517.80	0.13	

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	6.78	0.05

^{*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 S	Software	Licenses	Fraction of Usage*2(%)	
	Used				
	(Hours)				
ISV Software Licenses			27.22	0.02	
(Total)	37.33		57.55	0.03	

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