

Environment Conscious Aircraft Systems Research in Eco-wing Technology: Contract Research on Fan-Noise Simulation

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● Abstract

In a research of environment-conscious aircraft systems research for environmental conscious aircraft technology named "Research for Eco-Wing technology", innovative drag reduction technologies are investigated to reduce the fuel consumption for a conventional aircraft configuration. Aircraft noise prediction technologies and the conceptual design technologies are also developed for future aircraft which achieve low noise and high efficiency. The objective of this contract research on fan-noise simulation is to improve the stability of the computations using Linearized Euler Equations (LEE) to predict the fan noise shielding/interference effect by airframe.

<http://www.aero.jaxa.jp/eng/research/ecat/ecowing/>

● Reasons for using of JSS2

The JSS2 is used to develop the airframe, engine, and interference noise prediction tools that have high or middle fidelities for applicable to MDO design with high fidelity CFD and FEM analysis. The airframe-engine installation and/or shielding effects are one of important key issues for the future aircraft. The accuracy of current low fidelity analysis for the airframe, engine, and interference noise prediction is not good enough for application to MDO design with high fidelity CFD and FEM analysis toward the future low-noise aircrafts. The JSS2 is required for development of high or middle fidelity noise prediction tools for competitiveness in technology.

Achievements of the Year

The source code and compile options of a fan-noise simulation code were modified so that the code would efficiently work on JSS2 SORA-MA system. The performance of speed and efficiency in parallelization was evaluated by changing the number of process/thread to estimate computational resources required for practical predictions on fan noise shielding/interference effect by airframe.

Publications

N/A

Usage of JSS2

Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	32 - 1024
Elapsed Time per Case	10.00 hours

Resources Used

Fraction of Usage in Total Resources*1 (%): 0.06

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	154,868.66	0.02
SORA-PP	0.00	0.00
SORA-LM	0.07	0.00
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	192.71	0.13
/data	54,481.85	1.01
/ltmp	3,327.95	0.25

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	5.41	0.23

*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