Environment Conscious Aircraft Systems Research in Eco-wing Technology: Airframe-Engine Noise Reduction Technology

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● **Abstract**

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.

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

● **Reasons for using 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 accuracy of the airframe, engine, and interference noise prediction tools was evaluated by increasing the resolution of sound sources on the complex geomeries. In JAXA's multi-block structured grid CFD solver, UPACS, the resolution for sound sources was improved by employing the 5th-order scheme using a low-dissipation upwind SLAU scheme and changing the subgrid length scale in Delayed-Detached Eddy Simulation (DDES) to better predict development of shear layer on the stretched grid, etc. The effects were evaluated by analysis on aircraft aeroacoustic noise problems with changing grid densities.

● **Publications**

   N/A

● **Usage of JSS2**

●   **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	Automatic Parallelization
Number of Processes	800
Elapsed Time per Case	536 Hour (s)

●   **Resources Used**

Fraction of Usage in Total Resources[*1] (%): 0.52

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2] (%)
SORA-MA	4,376,157.16	0.54
SORA-PP	31,363.30	0.25
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	512.02	0.53
/data	19,892.15	0.35
/ltmp	8,821.23	0.76

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	162.93	5.70

[*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.