Environment Conscious Aircraft Systems Research in Eco-wing Technology:Aerodynamic System Design 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 and benefits of using JAXA Supercomputer System**

CFD analysis are used for the understanding of aerodynamic characteristics and evaluation of the performance in the aircraft design phase. Huge calculation resources and costs were required for the high fidelity and quick response CFD analysis for the optimum aerodynamic design process on complex aircraft geometry. JSS2 can achieve those requirements, the cost and time are drastically saved on the CFD analysis.

● **Achievements of the Year**

The aerodynamic performance of an unconventional low-noise aircraft with engines mounted over the rear-fuselage was evaluated by CFD. Comparing with the initial geometry, modifications of the rear fuselage and nacelle geometries were improved aerodynamic performance. The aerodynamic sensitivities by the rear part geometries were obtained to reduce the interference between the airframe and propulsion systems. (Fig. 1).
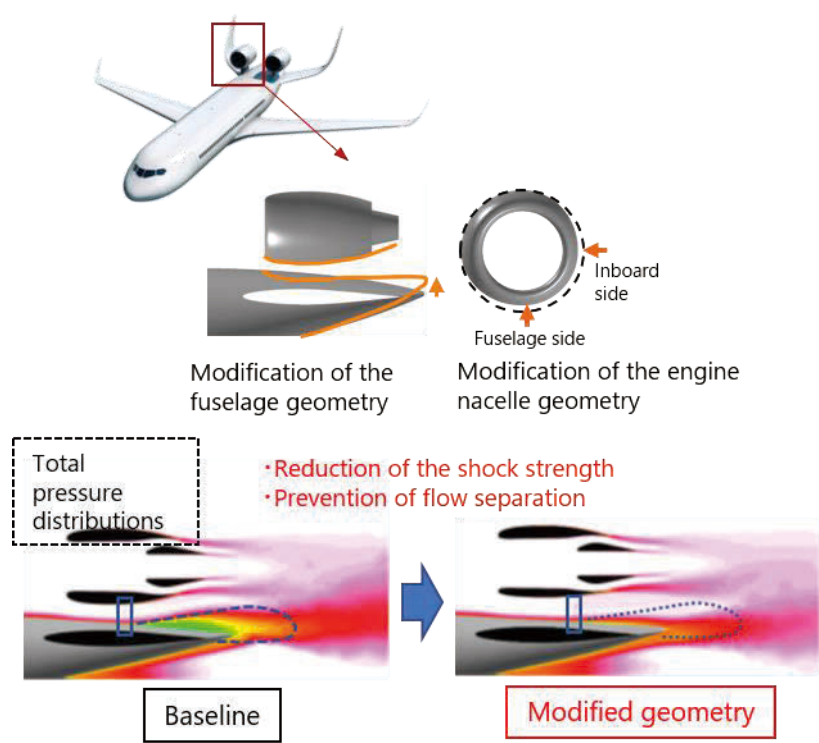
Fig. 1: Evaluation of aerodynamic performance by variations of the rear fuselage
and nacelle geometries

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	128 - 256
Elapsed Time per Case	25 Hour(s)

- **Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.18

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2](%)
SORA-MA	1,174,459.76	0.14
SORA-PP	62,144.96	0.40
SORA-LM	1,129.15	0.47
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	1,070.57	0.89
/data	51,641.92	0.88
/ltmp	9,097.57	0.77

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	71.57	1.80

[*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.