Research for Aircraft Aeroacoustic Noise Prediction Technologies

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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. In this research, aeroacoustic simulations have been conducted for a Krueger flap as an alternative to a conventional slat, in order to investigate its noise characteristics as well as aerodynamic performance.

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

● **Reasons for using JSS2**

Due to high computational cost of an aeroacoustic simulation, the use of JSS2 is required to obtain multiple cases of the simulation within a limited period.

● **Achievements of the Year**

A Krueger flap is a leading-edge high-lift device which works similarly to a conventional slat but deployed from the lower surface of the leading edge of the wing. In contrast to a conventional slat, a Krueger flap can keep the smoothed upper surface, thus it is considered as a high-lift device for future aircraft with drag reduction technologies associated with laminar flow control; however, its noise characteristics has not been intensively studied so far. In this research, Krueger flaps with different flap geometries and positions have been analyzed from the viewpoint of both aerodynamics and aeroacoustics. The results indicate the feasibility of a Krueger flap that provides comparable aerodynamic performance to a conventional slat with reduced noise levels.
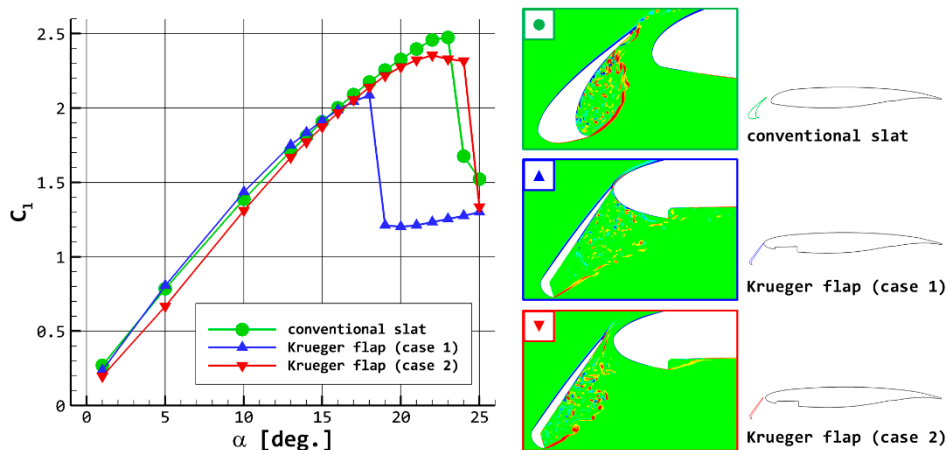
Fig. 1: Lift coefficients and instantaneous vorticity distributions of a conventional slat and Krueger flaps (alpha = 13.7 [deg.])

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	1728
Elapsed Time per Case	100 Hour (s)

● **Resources Used**

Fraction of Usage in Total Resources[*1] (%): 0.04

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2] (%)
SORA-MA	377,907.96	0.05
SORA-PP	1,047.31	0.01
SORA-LM	18.42	0.01
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	158.95	0.16
/data	3,255.21	0.06
/ltmp	651.04	0.06

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	0.84	0.03

*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.