Environment Conscious Aircraft Systems Research in Eco-wing Technology: Collaborative Research on Future Aircraft Conceptural Design

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Abstract

The discussion on the planforms of forward-swept wings for the furture aircraft design was conducted with CFD.　For this purpose, a parametric study of the planforms was conducted, and the influecnes of the design parameters on the aerodynamic characteristics and the flow fields are investigated.

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

Reasons for using of JSS2

In order to conduct the parametric study with CFD, a huge computational cost is required. It is almost impossible to have a computation by the workstation at our laboratory. So the computations with a super-computer are necessary to conduct our research because the available memory and CPU of supercomputer like JSS2 are much larger than the workstation at our laboratory.

Achievements of the Year

The planforms of the leading and trailing reversed wing of Boeing767 was employed as the base forward-swept wing. The aerodynamic characteristics and flow fields of the base wing were investigated. It is confirmed that the lift and drag slopes change at the angle of attack of 4deg. This result shows that the flow separation from the outer wing side to the inner wing side has occurred near the trailing edge. Next, the parameters of the planform are defined as shown in Fig. 2, and the aerodynamic performance of these planforms were investigated. As the result, the semispan length has better performance on the aerodynamic characteristcs when the length becomes larger. However, the changes in inner/outer swept-

forward angles and chord length at the kink position of the wing contribute less to the change in the aerodynamic characteristcs. Then, the aerodynamic characteristcs becomes worse when the extreme change in outer angle and the chord length is observed.

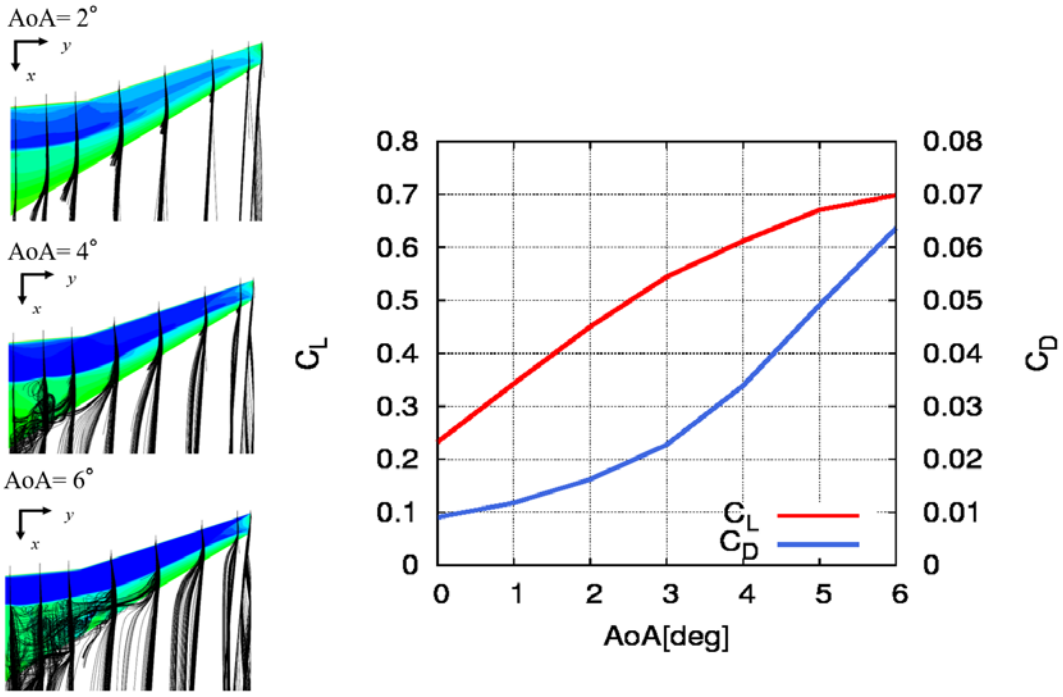

Fig.1 Computational results of baseline forward-swept wing

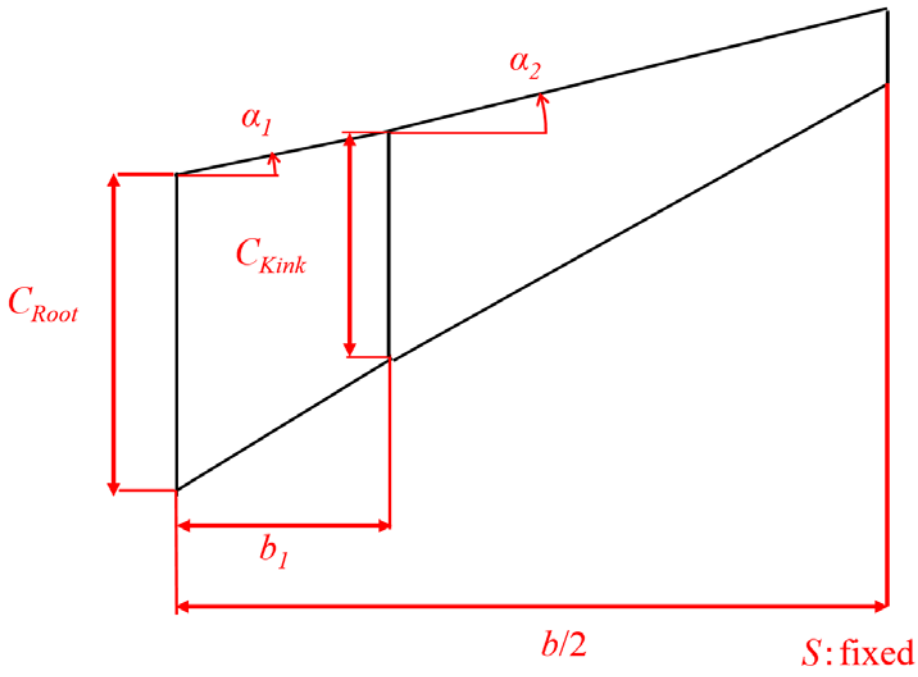

Fig.2 Parameter definition of forward-swept wing planform

Publications

N/A

Usage of JSS2

Computational Information

Parallelization Methods	N/A
Thread Parallelization Methods	OpenMP
Number of Processes	1
Elapsed Time per Case	660.00 minutes

Resources Used

Fraction of Usage in Total Resources*1 (%): 0.02

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	197,997.85	0.03
SORA-PP	0.00	0.00
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	162.71	0.11
/data	3,370.26	0.06
/ltmp	790.55	0.06

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	0.01	0.00

*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