

FINE (Flight Investigation of skiN-friction reducing Eco-coating)

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Subject Category: Aeronautical Technology

URL: <https://www.jss.jaxa.jp/en/ar/e2019/11514/>

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● Abstract

By developing a particular riblet pattern that is effective at reducing the turbulence frictional resistance, and by producing and applying an easy-to-coat method that can create an optimum riblet surface on the airframe, reduce friction drag in the turbulence boundary layer.

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

● Reasons and benefits of using JAXA Supercomputer System

CFD analysis are used for developing a particular riblet pattern that is effective at reducing the turbulence frictional resistance. Huge calculation resources and costs are required for the high fidelity and quick response CFD analysis for obtaining the optimum riblet pattern. Use of JSS2 is indispensable for these requirements; the cost and time on the CFD analysis are drastically saved.

● Achievements of the Year

We have performed a series of direct numerical simulations of a turbulent channel flow over riblets in order to understand the basic characteristics regarding the riblets for the flight testing in the 'FINE' project. Consequently, the performance of the riblets, i.e. the effect of shrinking the streamwise extent of sinusoidal riblets, have been successfully clarified.

● Publications

N/A

● Usage of JSS2

● Computational Information

Process Parallelization Methods	MPI
Thread Parallelization Methods	Automatic Parallelization
Number of Processes	64 - 512
Elapsed Time per Case	500 Hour(s)

● Resources Used

Fraction of Usage in Total Resources*1(%): 1.28

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2(%)
SORA-MA	11,614,271.43	1.41
SORA-PP	13.38	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	5.68	0.00
/data	9,847.38	0.17
/ltmp	813.80	0.07

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2(%)
J-SPACE	0.82	0.02

*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.