Research of unsteady flow simulation toward prediction of full-flight envelope

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● **Abstract**

The research related to unsteady flow simulation of the aircraft buffet phenomenon is conducted aimed for the prediction of full-flight envelope.

● **Reasons for using JSS2**

A huge amount of computational resources is needed to simulate the aircraft buffet phenomenon which is high-Reynolds number and complex flow including flow separation.

● **Achievements of the Year**

LBM code for large scale unsteady flow simulation is now developping and the aerodynamic/aeroacoustic simulation of 30P30N, which is a high-lift device, was conducted for the validation. As a result, high-frequency peak from slat trailling edge and narrow band peaks (NBPs) are well captured by Cascaded LBM approach.
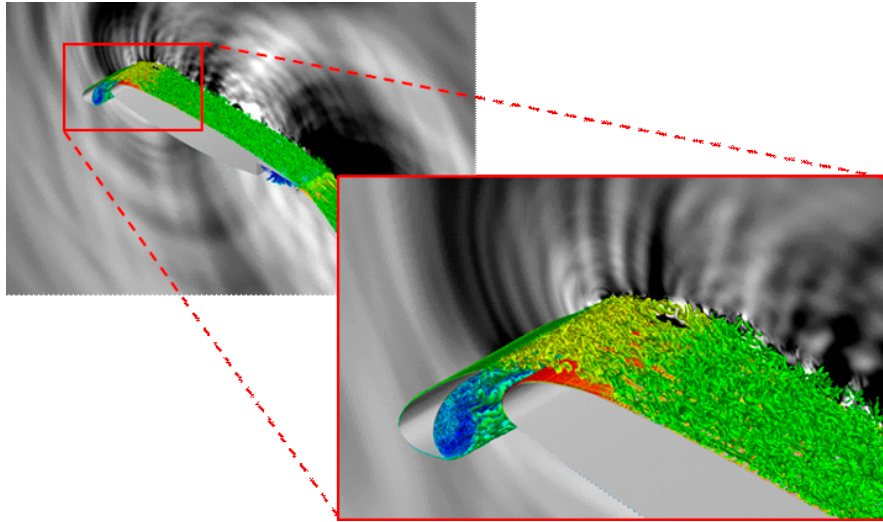
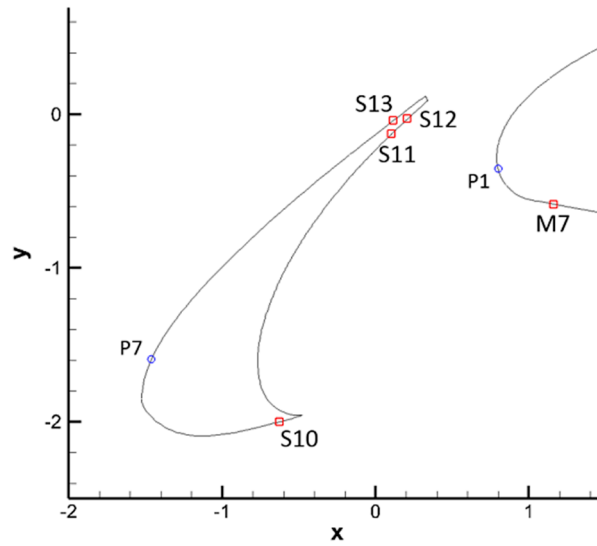Fig. 1: visualization of instantaneous flow field
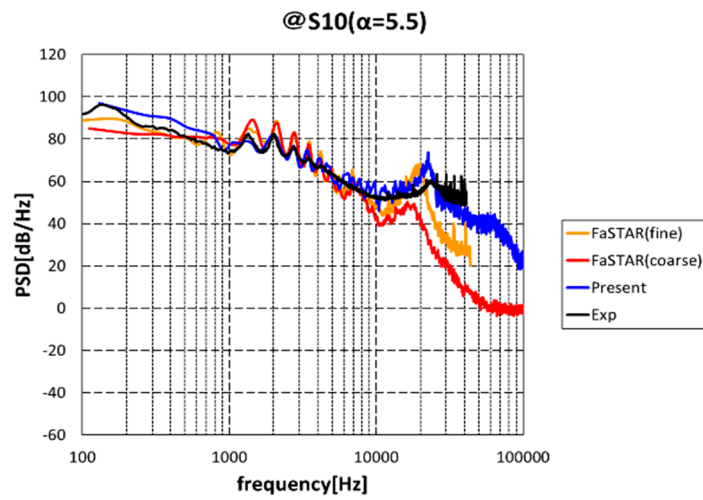

Fig. 2: data sampling location for PSD

Fig. 3: PSD data comparison at port S10

● **Publications**

N/A

● **Usage of JSS2**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	32 - 256
Elapsed Time per Case	100 Hour (s)

● **Resources Used**

Fraction of Usage in Total Resources[*1] (%): 3.93

Details

Computational Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage[*2] (%)
SORA-MA	36,045,506.81	4.41
SORA-PP	80,535.07	0.64
SORA-LM	15,170.53	7.07
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2 (%)
/home	365.36	0.38
/data	31,804.31	0.56
/ltmp	7,632.64	0.65

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	3.02	0.11

[*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.