Research on high load compressor technology

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Abstract

For the international joint development of jet engines, it aims to develop and demonstrate core engine technology with little experience in Japan. In order to achieve high aerodynamic performance of a compact size and a total pressure ratio of 20 or more, we designed a multi-stage axial compressor with mixed flow compressor applied in the final stage and confirmed its validity by numerical analyses.

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

Reasons for using of JSS2

In multistage compressor analyses, the number of grid points is large. It is necessary to analyze many cases to obtain a performance curve. It is necessary to use supercomputers in order to produce results in a limited time period and feed back to the multistage compressor design.

Achievements of the Year

The aerodynamic performance was predicted by multi-stage steady-state analysis for the high pressure compressor with seven stage axial compressor and one mixed flow compressor designed by JAXA. Although there was a problem with aerodynamic performance in the initial design shape, we confirmed that it was improved by the improved design and confirmed the validity of the high pressure comressor design.

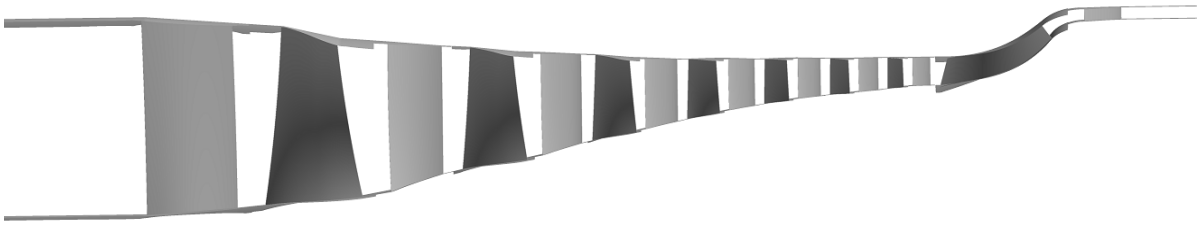

Fig.1 High Pressure Compressor (Designed by JAXA)

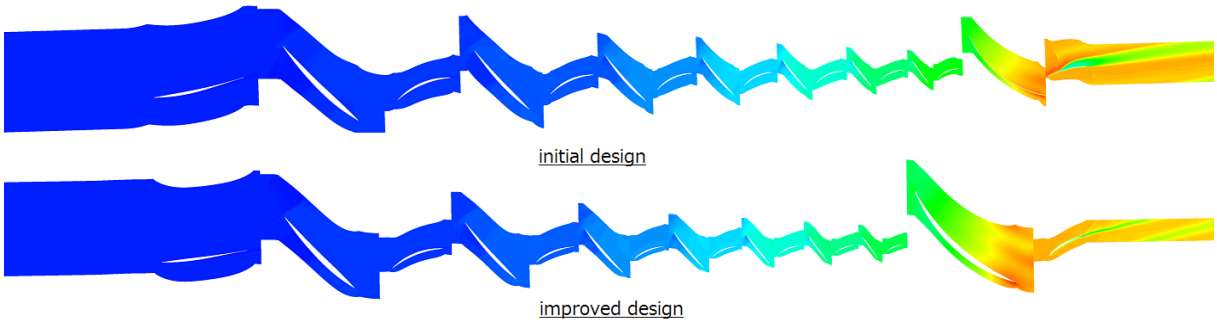

Fig.2 Improved design result (total pressure distribution)

Publications

N/A

Usage of JSS2

Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	OpenMP
Number of Processes	66 - 95
Elapsed Time per Case	5.50 hours

Resources Used

Fraction of Usage in Total Resources*1 (%): 0.21

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	1,482,092.70	0.19
SORA-PP	48,319.33	0.60
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	019.75	0.01
/data	197.55	0.00
/ltmp	4,045.76	0.31

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