

## SIP CFRP high fidelity modeling technology

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### ● Abstract

JAXA contributes to the SIP (Cross-ministerial Strategic Innovation Promotion) program, which is governed by Cabinet Office, Government of Japan. JAXA takes charge high fidelity modeling of the polymer matrix composites for aircraft structure. The calculation for the modeling is performed in this topic.

[http://www.jst.go.jp/sip/dl/k03/jst\\_pamphlet\\_english.pdf](http://www.jst.go.jp/sip/dl/k03/jst_pamphlet_english.pdf)

### ● Reasons for using of JSS2

Damage simulation of the open hole tensile (OHT) test against CFRP was performed using explicit finite element damage simulation. Huge number of DOFs was necessary for detailed damage simulation in CFRP. Application of the supercomputer system makes such high-computational-cost calculation possible.

### ● Achievements of the Year

Damage simulation of CFRP under open-hole tensile (OHT) test was performed using ECDM (Enhanced Continuum Damage Mechanics) model, which was damage model developed in JAXA.

Simulation was performed using ABAQUS/Explicit 2016 on JSS2 system. Each ply of the CFRP laminate was modeled by one continuum shell element in the thickness direction. ECDM model was implemented using user-subroutine of ABAQUS. In FY29, ECDM model was modified and final failure criteria was modified. These modification improved the precision of the simulation results.

Figure 1 shows model overview, and Figure 2 shows the predicted damage.

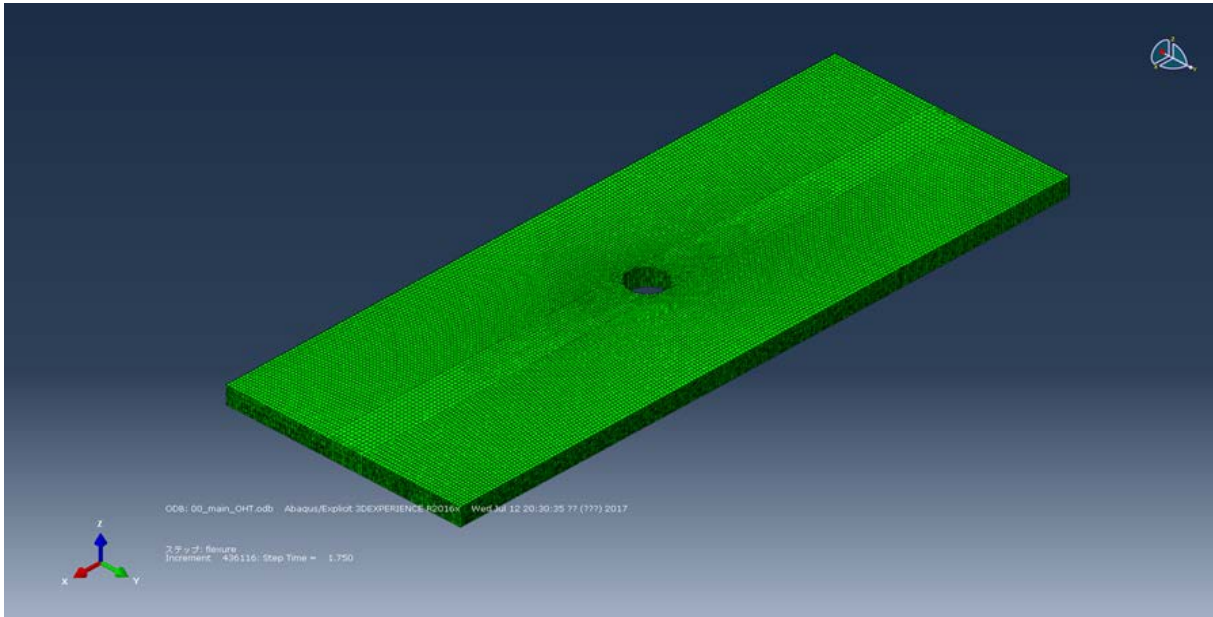


Fig.1 Model overview of the Open-hole-tension simulation

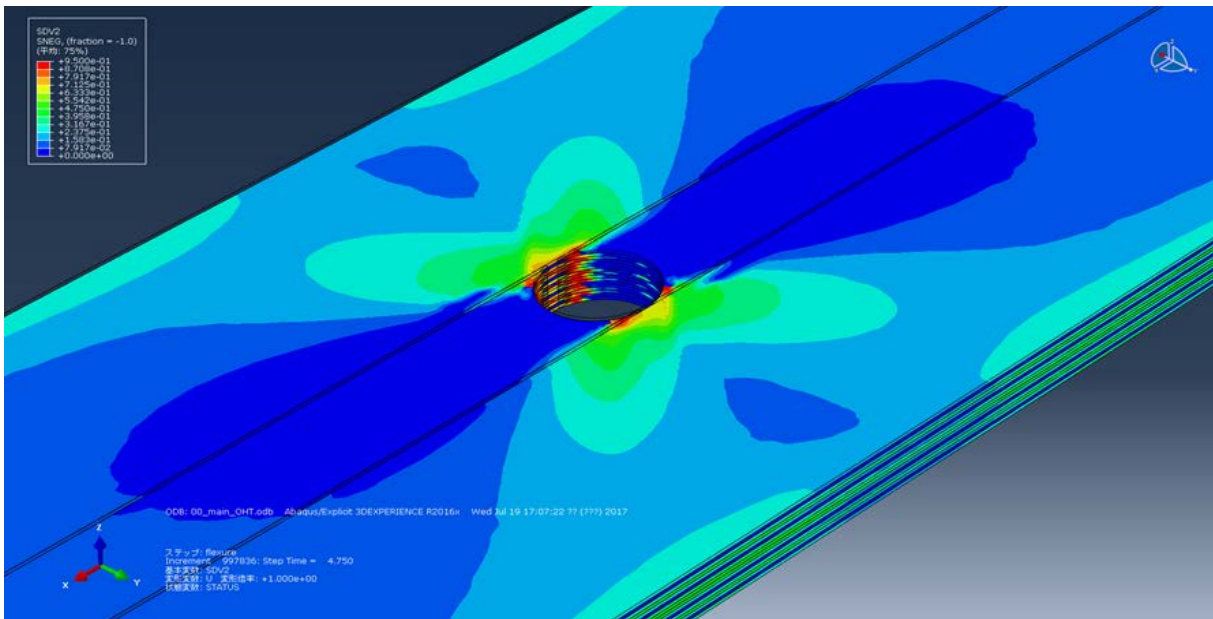


Fig.2 Predicted damage

● Publications

N/A

● Usage of JSS2

● Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	12 - 120
Elapsed Time per Case	60.00 hours

● Resources Used

Fraction of Usage in Total Resources\*1 (%): 0.00

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	0.00	0.00
SORA-PP	3,968.24	0.05
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	003.18	0.00
/data	031.79	0.00
/ltmp	651.04	0.05

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