

## Construction and maintenance of JIANT, a quality engineering tool for Safety&MissionAssurance platform

Report Number: R21EH2900

Subject Category: Common Business

URL: <https://www.jss.jaxa.jp/en/ar/e2021/18083/>

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### ● Abstract

JAXA and Kyoto University are researching with quality engineering tools (JIANT) and wallstat, a seismic simulator for wooden buildings.

Our theme is research on the combination of testing and simulation (data assimilation). This study is a joint research of JAXA-Kyoto University-Nara Women's University.

### ● Reasons and benefits of using JAXA Supercomputer System

The purpose of using a supercomputer is to speed up calculations.

The calculation of wallstat takes 40 minutes per case on a general PC.

That means that if we perform 6000 calculations in one case study, it takes a total of 160 days, but if we use JSS3, we can complete them in a few hours.

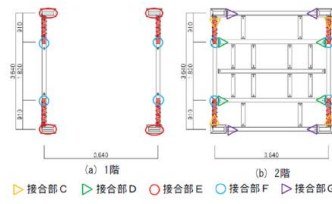
### ● Achievements of the Year

The test results of a two-story wooden building and the simulation were combined. Originally, the cycle and maximum value of the results did not match, but by performing a comprehensive calculation of 14641 cases, we obtained almost the same results. The calculation time in JSS3 was about 3 hours.

Since good results were obtained, we made presentations to the Architectural Institute of Japan, the Wood Society, etc.

■ 実大震動台実験

入力地震動：BSL 85%  
平面：3640mm x 3640mm



- (1) 第26回 計算工学講演会  
2021.6. 品質工学を利用したデータ同化手法の検討と木造住宅倒壊シミュレーションへの適用
- (2) 2021年度 日本建築学会大会(東海) 2021.9 品質工学を用いた木造住宅倒壊解析シミュレーションのデータ同化手法の検討  
その4 パラメータ範囲の変更による3階建て木造軸組構法住宅の震動台実験のデータ同化の再検討  
上松千陽、角有司、瀧野敦夫、中川貴文
- (3) 2021年度 日本建築学会大会(東海) 2021.9 品質工学を用いた木造住宅倒壊解析シミュレーションのデータ同化手法の検討  
その5 2階建て木質ラーメン架構の振動台実験のデータ同化  
難波宗功、中川貴文、角有司、瀧野敦夫、五十田博
- (4) 2021年度 日本建築学会大会(東海) 2021.9 品質工学を用いた木造住宅倒壊解析シミュレーションのデータ同化手法の検討  
その6 面材耐力壁の履歴特性の検討  
中川貴文、角有司、難波宗功、瀧野敦夫、五十田博

Fig. 1: Target full-scale vibration experiment and reference paper

■ 京大生存圏研究所が開発した、  
木造軸組構法住宅の耐震シミュレーションツール (Wallstat) を使用

- ・ 壁・トラス
- ・ 回転ばね、張力ばね、等をモデル化

■ JAXAの品質工学ツール (JIANT) の利用

- ・ L121xL121=14641回の計算  
(3兆回 x 3兆回=9桁8497枚3000京の計算と同等の網羅性)
- ・ JSS3での計算時間は約3時間

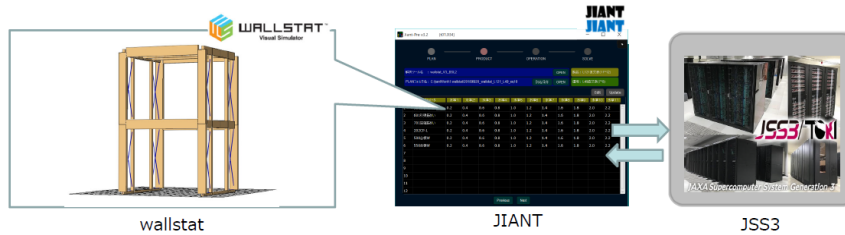


Fig. 2: Calculation by wallstat and JIANT

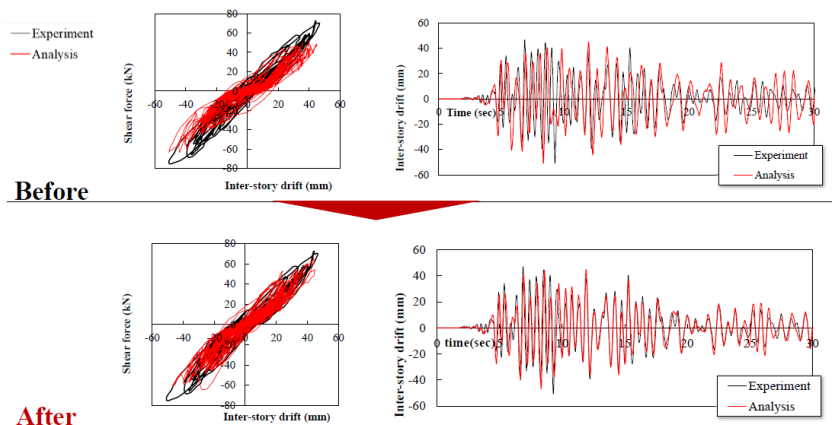


Fig. 3: Data assimilation result (top: human adjustment result, bottom: JIANT result)

- **Publications**

N/A

- **Usage of JSS**

- **Computational Information**

Process Parallelization Methods	N/A
Thread Parallelization Methods	N/A
Number of Processes	1
Elapsed Time per Case	7200 Second(s)

- **JSS3 Resources Used**

Fraction of Usage in Total Resources\*1(%): 0.62

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	365.32	0.00
TOKI-ST	4,281,573.70	5.27
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	83.49	0.01
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage*2(%)
/home	150.00	0.15
/data and /data2	52,200.00	0.56
/ssd	1,000.00	0.26

Archiver Resources		
Archiver 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.

● **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage*2(%)
ISV Software Licenses (Total)	0.00	0.00

\*2: Fraction of Usage : Percentage of usage relative to each resource used in one year.