

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

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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-Osaka Institute of Technology.

● 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

As a research with Kyoto University Research Institute for Humanosphere, we studied data assimilation under multiple design targets/environmental conditions this year (Fig1). This time, we focused on a three-story building and adjusted it for two buildings and two seismic waves. A summary of the results achieved so far was presented in a special lecture at the 31st Society for Quality Engineering Technology Presentation in June 2023. At this competition, he received the 2023 Quality Engineering Society Japanese Standards Association Chairman's Award.



Fig. 1: Issue of this research: Data assimilation under multiple design targets/environmental conditions

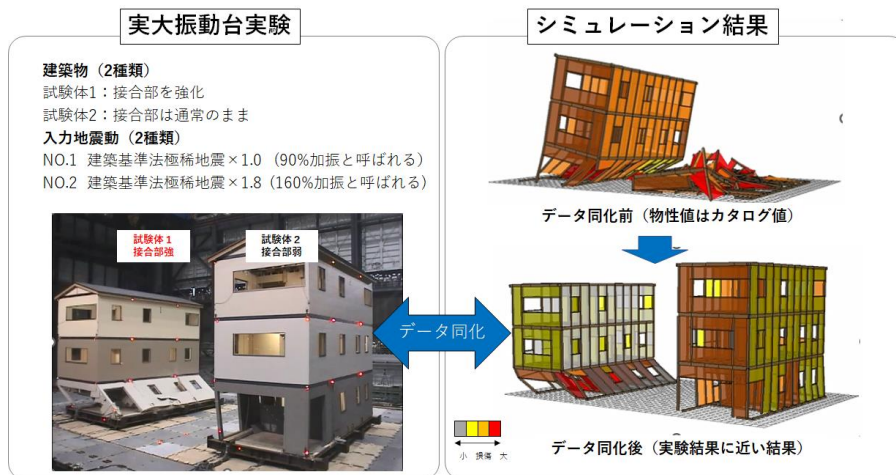
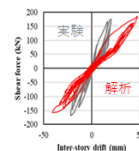


Fig. 2: Data assimilation of shaking table experiments and simulations

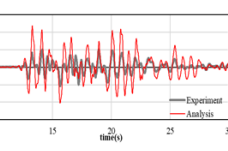
2つの地震波のデータ同化（試験体1の場合）

90%加振：NO.1 建築基準法極稀地震×1.0

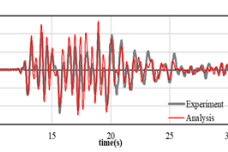
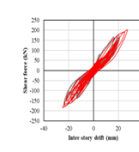
1F荷重変形関係



1F層間変形時刻歴応答

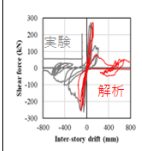


JIANTによるデータ同化

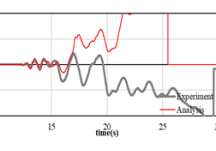


160%加振：NO.2 建築基準法極稀地震×1.8

1F荷重変形関係



1F層間変形時刻歴応答



JIANTによるデータ同化

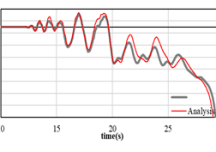
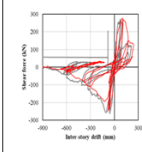


Fig. 3: Data assimilation by two seismic waves (for building 1)

- **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(%): 0.06

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	0.04	0.00
TOKI-ST	474,239.88	0.51
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	5.15	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	245.00	0.20
/data and /data2	56,270.00	0.35
/ssd	0.00	0.00

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)	2.90	0.00

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