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 Techinology-Nara Womans University-HiroshimaUniv.-OitaUniv-KumamotoUniv..

● **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 part of a joint research project with the Kyoto University Research Institute for Sustainable Humanosphere, this year we successfully assimilated data for three- and five-story wooden buildings, publishing these as peer-reviewed papers 1 and 2. We also applied this data to a new damage prediction method, obtaining favorable results, which we published as peer-reviewed paper 3.
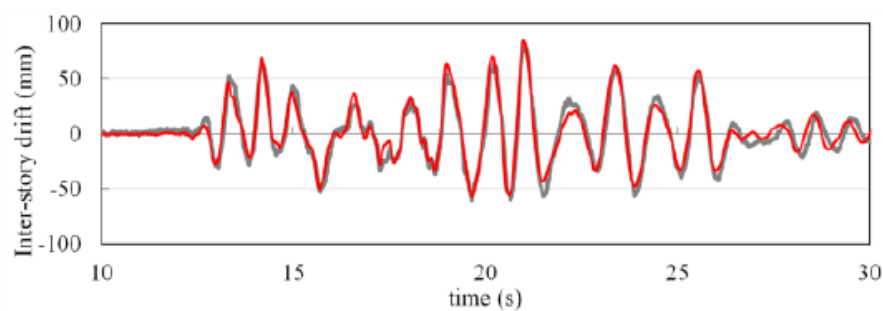
The peer-reviewed paper published in 2023 won the 2024 Quality Engineering Award, Silver Paper Award.

Fig. 1: 3-story wooden building

Fig. 2: 5-story wooden building

(c) Time history curve of inter-story drift of 1F in BSL112.5%

Fig. 3: Data assimilation results (black: test result,　red: simulation 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](%): 0.06

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	0.00	0.00
TOKI-ST	388,303.68	0.40
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
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	1,269.00	0.86
/data and /data2	138,090.00	0.66
/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)	13.41	0.01

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