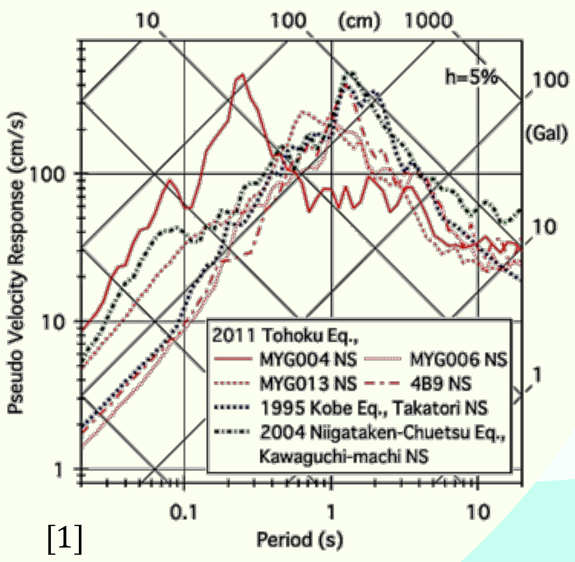
Design of an acceleration amplifier for shake table test

its application to 2011 Tohoku earthquake MYG004 ground motions

Uncommon observed building damage linked with recorded ground motions during 2011 Tohoku earthquake

Ongoing research theme :

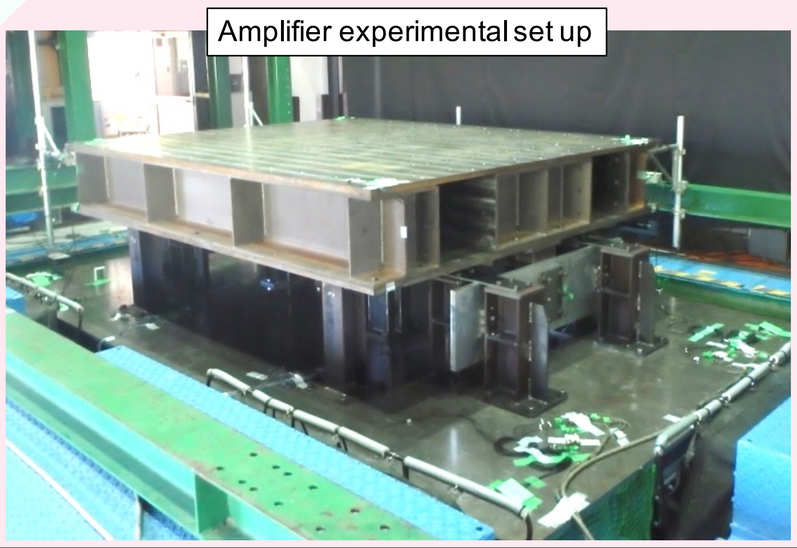
- MYG004 sensor failure
- Influence of frequency
- Site amplification

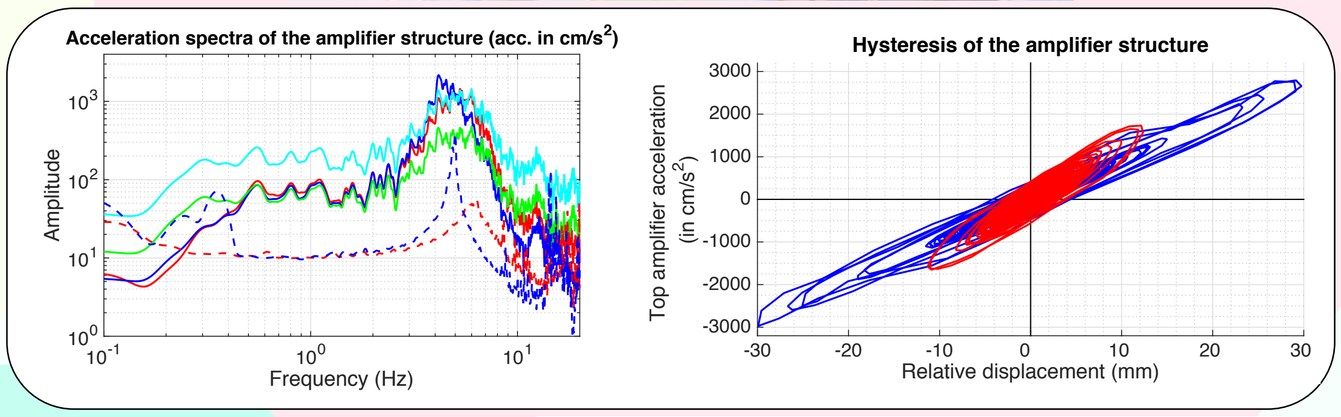


[1]

Designed shake table acceleration amplifier to reproduce high acceleration solicitation

Amplifier experimental set up



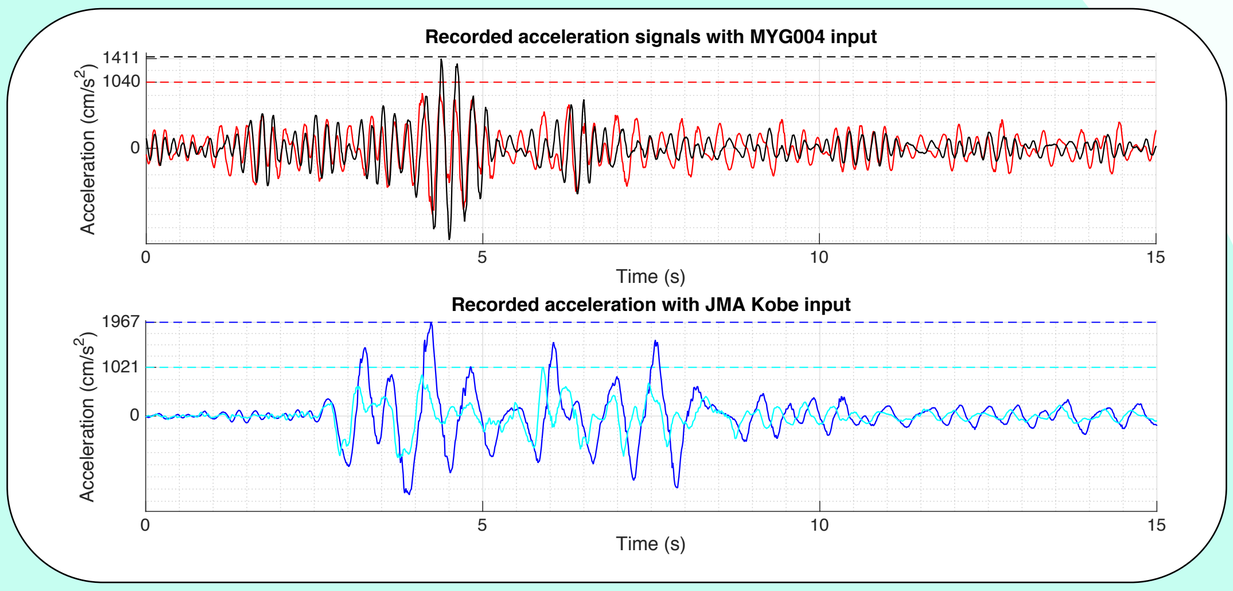


- Damped amplifier structure
- Undamped amplifier structure, with 2 additional tons
- MYG004 observed data
- Scaled to 1 g MYG004 obs. data (shake table input data)
- Damped amplifier spectral ratio (10* display amp.)
- Undamped amplifier, with 2 tons, spectral ratio (10* display amp)

High acceleration ground motions solicitation on a wood frame

Wood frame with amplifier experimental set up

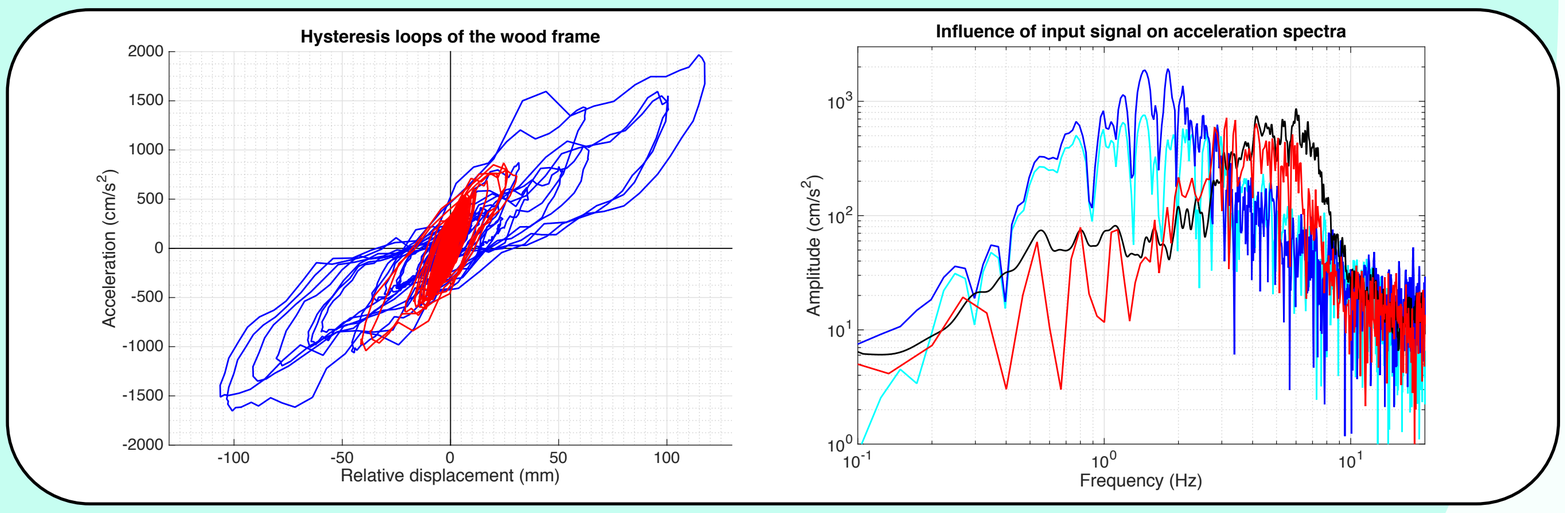
Influence of frequency on damage initiation



- Kobe 120% intensity ground solicitation
- Kobe 120% intensity top of wood frame
- MYG004, scaled to 1g, 80% intensity, ground solicitation (75s-90s)
- MYG004, scaled to 1g, 80% intensity, top of wood frame (75s-90s)

Important structural damages are observed only with JMA Kobe input

- Frequency content is primordial for damage initiation
- Velocity solicitation must be a better index to evaluate damage risks



[1] Motosaka M. 2012. Lessons of the 2011 Great East Earthquake focused on characteristics of ground motions and building damage. *Proc. Int. Symposium on Eng. Lessons learn from the Greast east Japan earth.*

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