

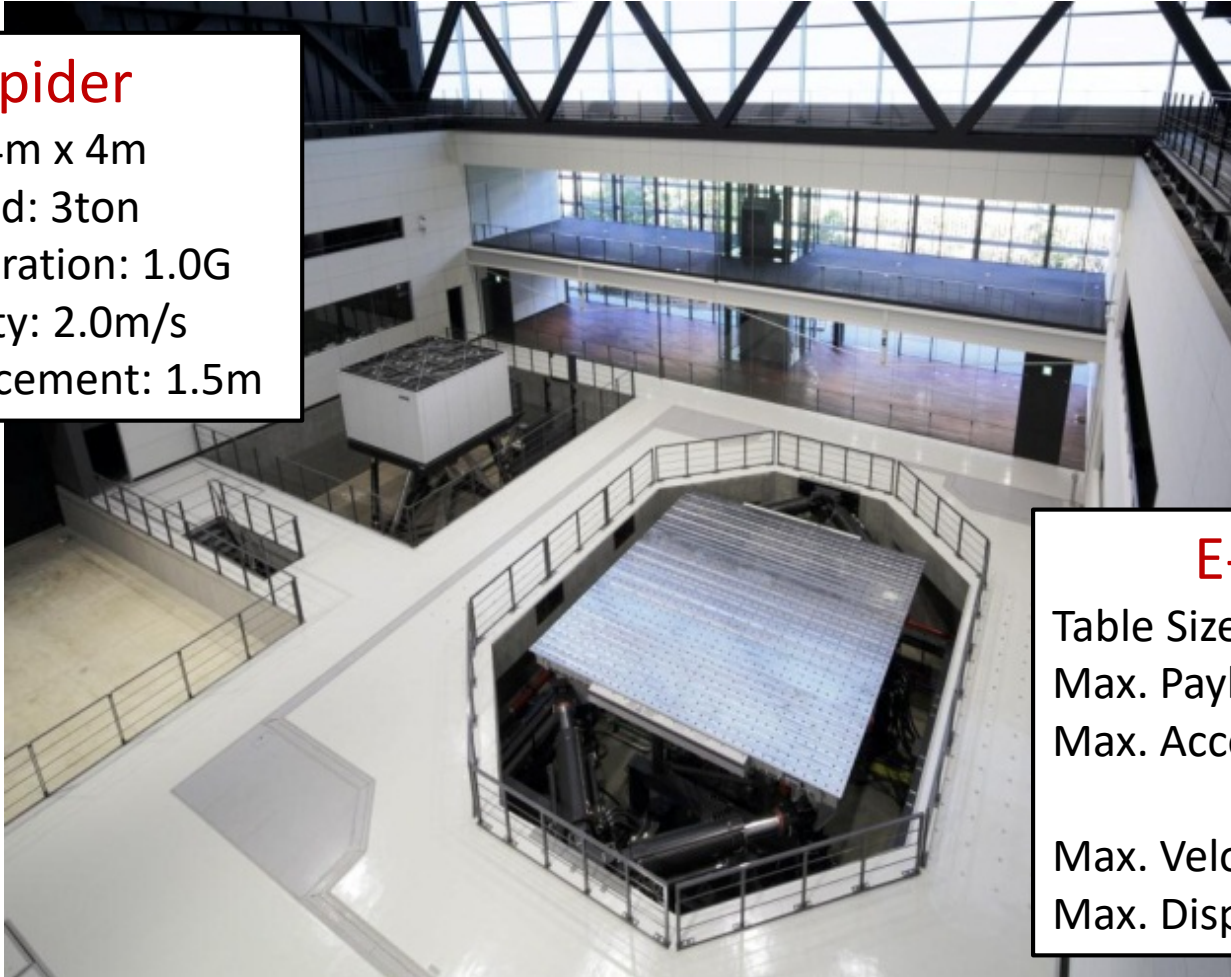
Advanced Earthquake Engineering Laboratory

- Equipped with two state of the art shaking tables –

Hitoshi Kumagai (Shimizu Corporation)

E-Spider

Table Size: 4m x 4m
Max. Payload: 3ton
Max. Acceleration: 1.0G
Max. Velocity: 2.0m/s
Max. Displacement: 1.5m



E-Beetle

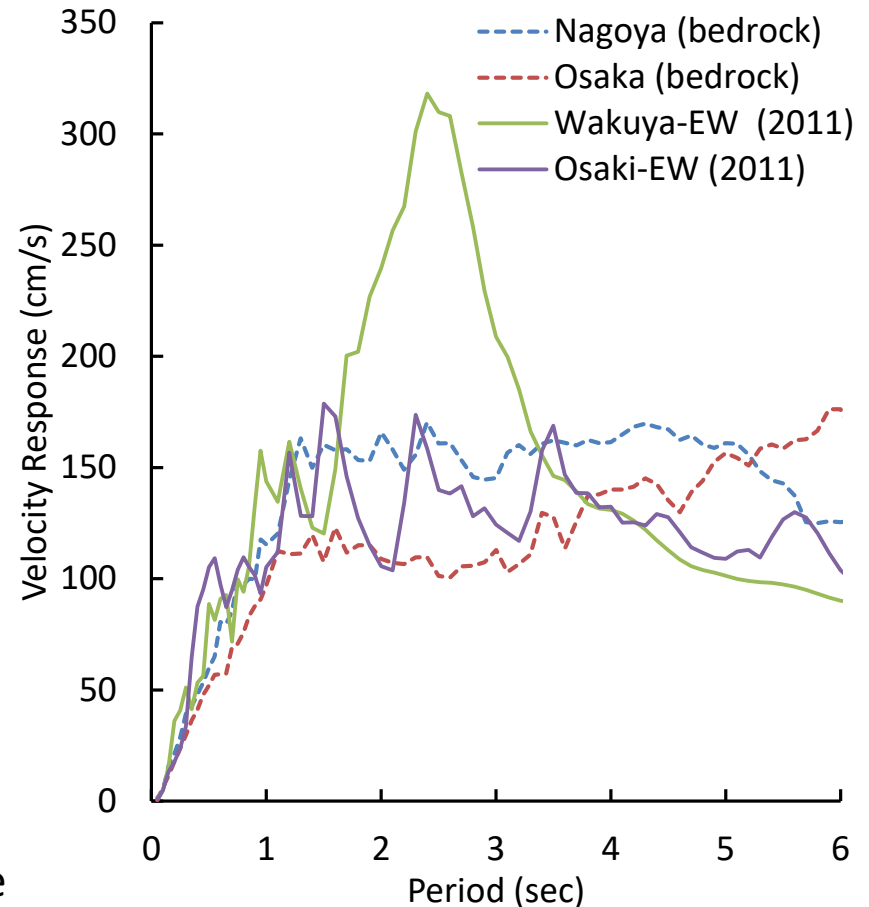
Table Size: 7m x 7m
Max. Payload: 70ton
Max. Acceleration: 2.7G
(with 35ton)
Max. Velocity: 2.0m/s
Max. Displacement: 0.8m

Long-Period Earthquake Ground Motion - Subduction Zone Earthquake -

The 2011 off the Pacific coast of Tohoku Earthquake (Mw9.0)



Focal Area of Nankai Trough Scenario Earthquake
(M9 Class)

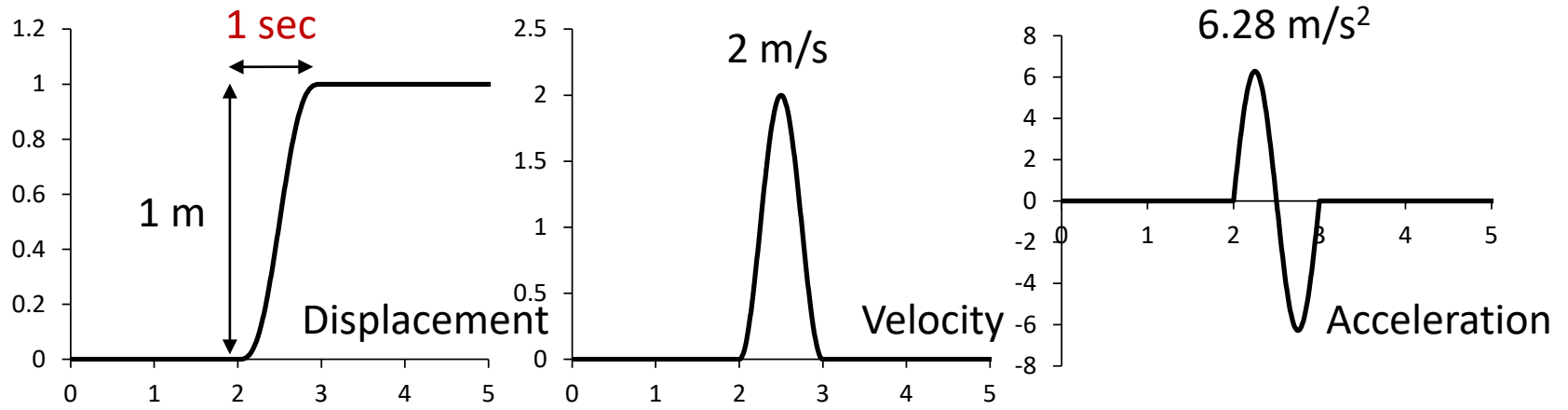


Velocity Response Spectra (h=0.05)

Earthquakes in subduction zone have a great influence on long period structures

Near-Fault Ground Motion

Fling step affect the structure whose natural period is longer than pulse period



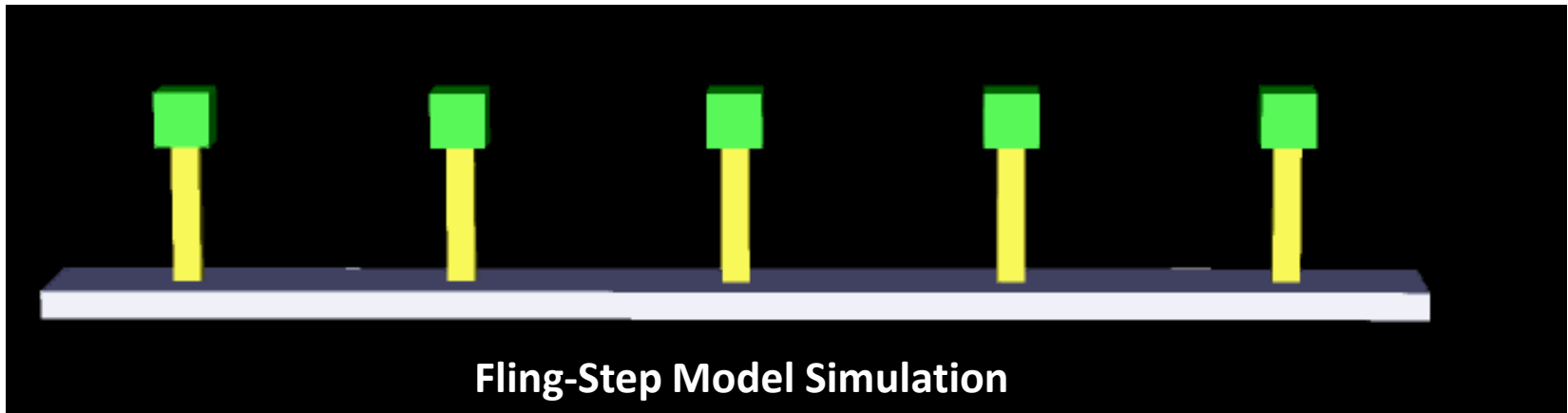
Natural Period 0.5sec

1sec

2sec

4sec

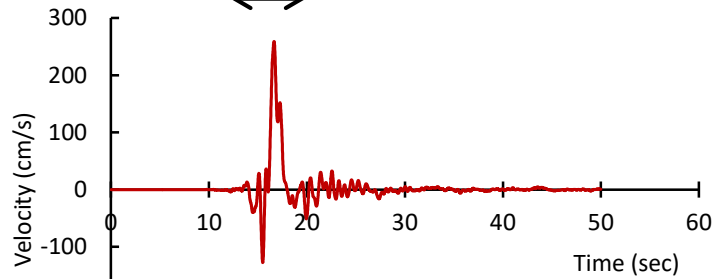
6sec (h=0.05)



Near-Fault Ground Motion

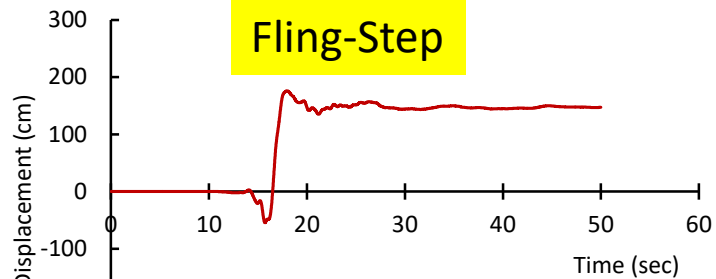
The 2016 Kumamoto Earthquake (Apr. 16)

$T_p = 1.5 \text{ sec}$



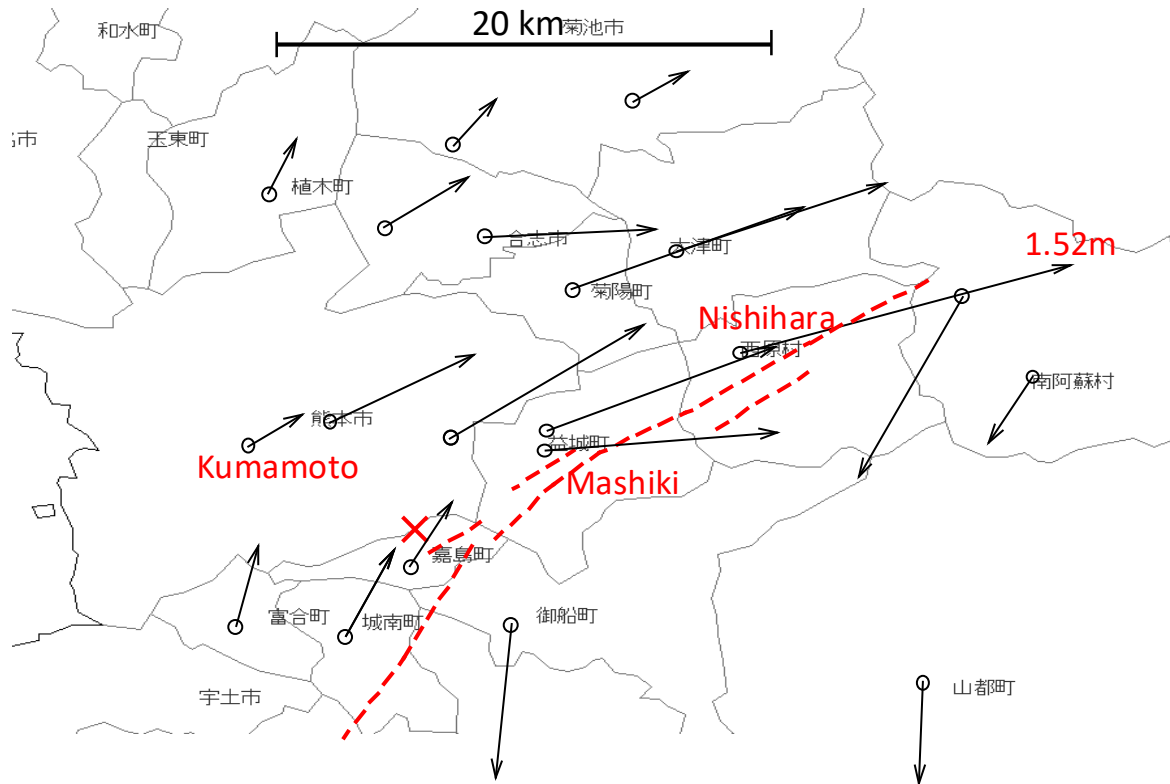
Velocity (EW)

Fling-Step



Displacement (EW)

Nishihara Seismic Stn.

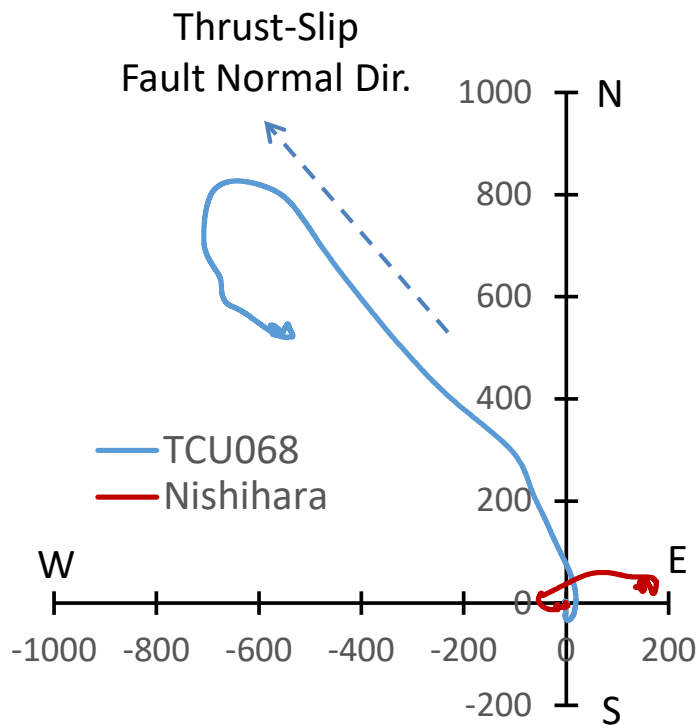


- Note:
- X Epicenter
 - Seismic Station
 - - - - - Earthquake Fault
 - Fling-Step
- 1.0m

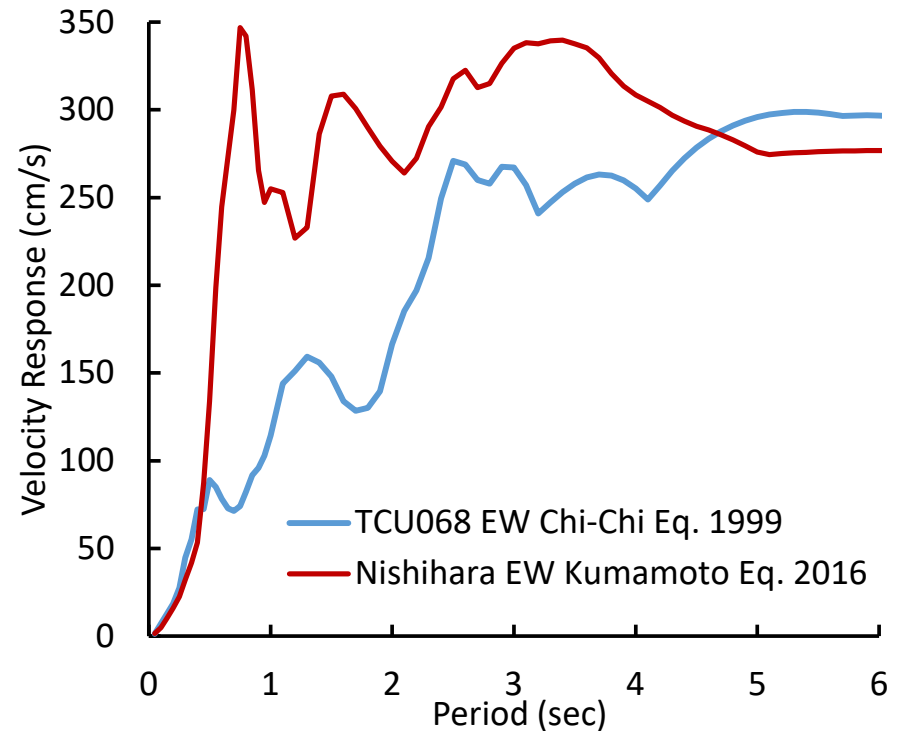
Mapping of Fling-Step

Near-Fault Ground Motion

Comparison between Kumamoto and Chi-Chi earthquake

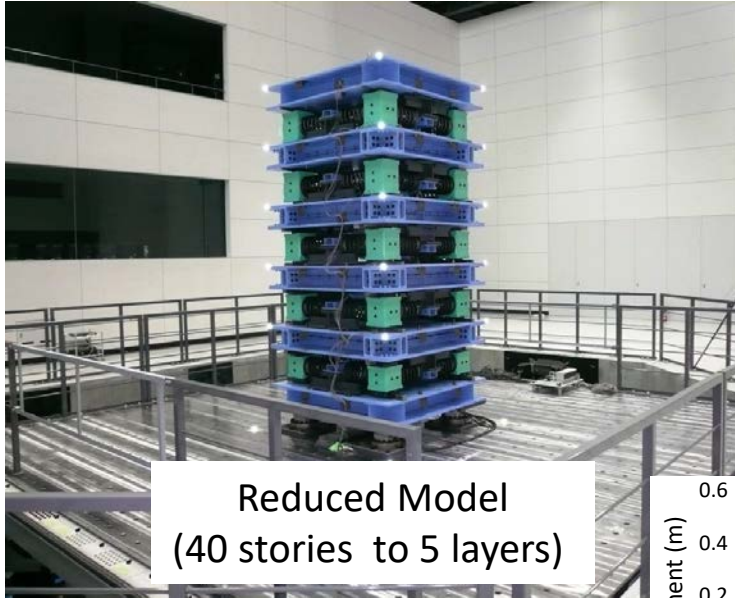


Trajectories of Displacement



Velocity Response Spectra ($h=0.05$)

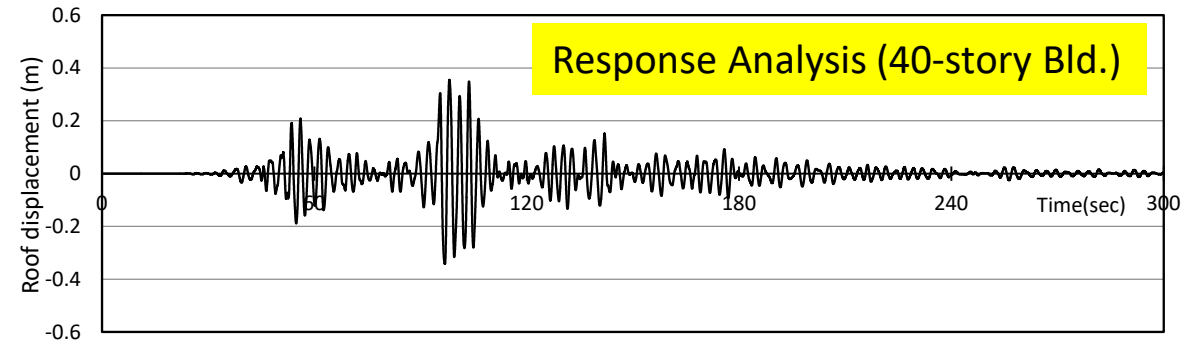
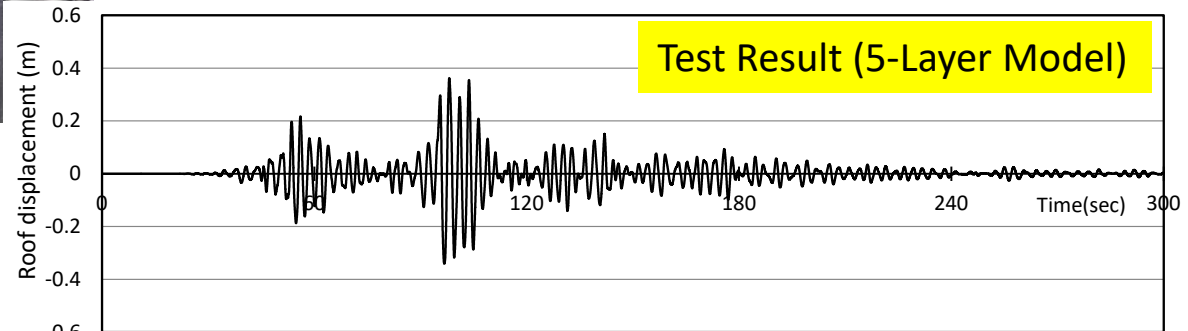
Shaking Table Test on High-Rise Building with “E-Beetle”



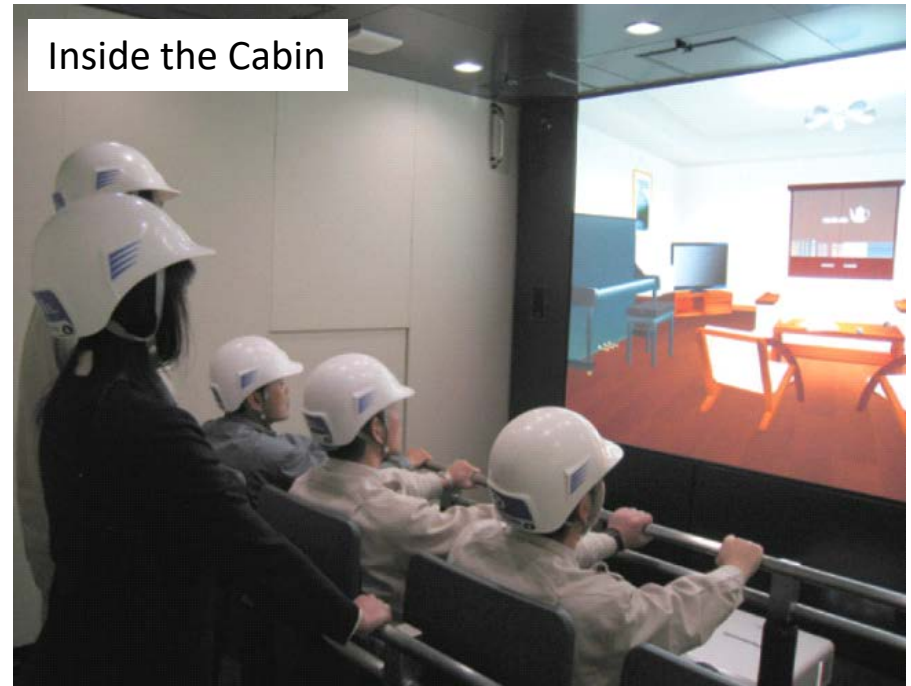
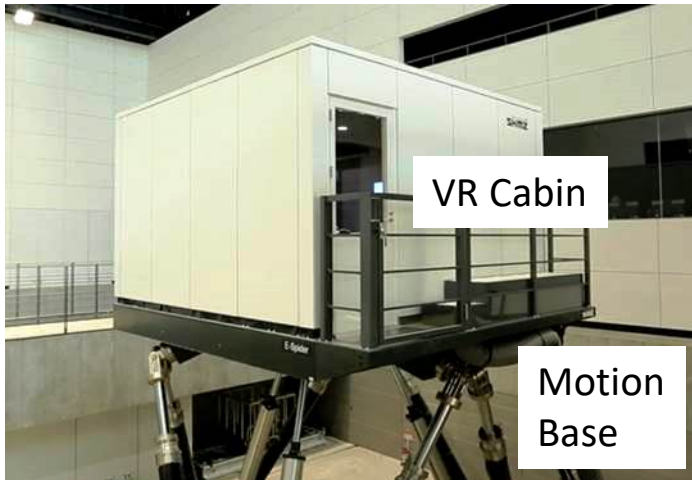
< Input Ground Motion >

Great East Japan Earthquake
on March 11th, 2011

Sendai Regional
Metrological Observatory



Virtual Experience in High-Rise Building with “E-Spider”



“E-Spider” can reproduce the situation in the room (VR simulation), as well as the floor motion of high-rise building.

Virtual Experience in High-Rise Building with “E-Spider”

Real-Time VR Simulation

Response on 5th Floor of 5-Story Building
JMA Kobe (1995) Input

Conventional RC Building



Base Isolated RC Building

