



# SHAKING TABLE TESTS OF MODEL HOUSE OF BRICK MASONRY FOR SEISMIC CONSTRUCTION

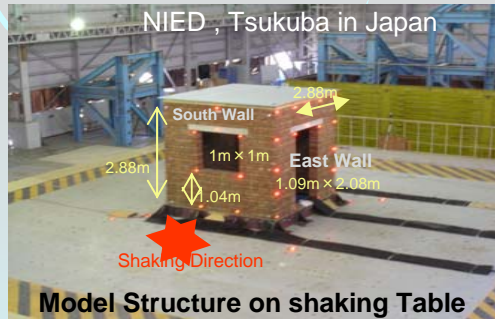
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Full scale shaking table tests of a model house of brick masonry were conducted for the following scope.

- [1] To understand actual seismic behaviors of brick masonry houses at safety limit.
- [2] To share experimental data among participating experts from developing countries for their activities for safer housing
- [3] To verify various seismic evaluation methods – from expert analysis methods of FEM, DEM to simplified calculation

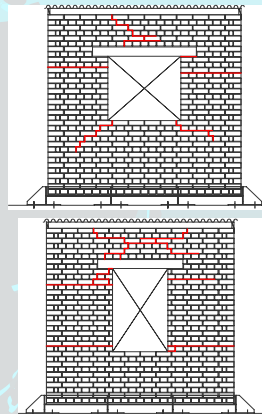
Wall structure type being popular in South Asia along Himalayan earthquake belt was designed to reproduce the structure under actual construction conditions.

### Non-reinforcement wall structure



Brick : Pakistan  
Mortar  
Cement : Sand = 1 : 8

Compressive Strength  
Brick 14.7 N/mm<sup>2</sup>  
Mortar 10.0N/mm<sup>2</sup>



### Cracks Caused by Pulse Shock Motion

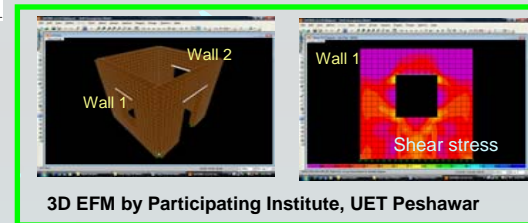
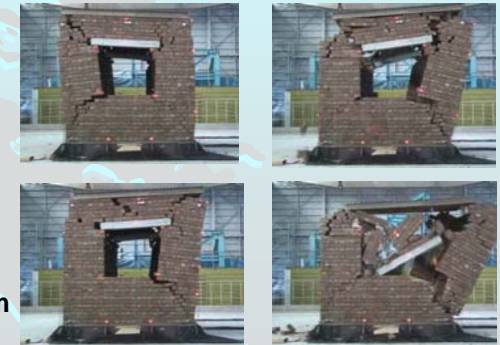
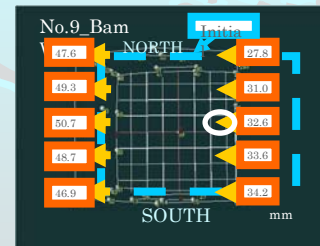
**Measurements**  
Optical Instrument for 3D Displacement Records  
Video Recorder  
Accelerometer  
Strain Gauge



### Exciting Cases and Damage to Structure

No.	Input Motion	Damage
1.	2003 Iran Bam Eq. EW 75cm/s	No damage
2.	2003 Iran Bam Eq. EW 100cm/s	No damage
3.	1995 JMA Kobe NS 100cm/s	No damage
4.	Sin 15Hz 1G 50 second	No damage
5.	Sin 1Hz 10cm 0.4G 20 second	No damage
6.	Pulse Shock 1 40cm/s	Cracks appeared
7.	Pulse Shock 2 -40cm/s	Cracks developed
8.	Pulse Shock 3 30cm/s	No development of cracks
9.	2003 Iran Bam Eq. EW 100cm/s	Cracks developed
10.	1995 JMA Kobe NS 100cm/s	Collapsed

(\* Time Scale = 0.79)



Collapse process observed at shaking test of Kobe Eq. (No.10)

Proposed by T. Nakagawa

Normal spring Shear springs

Analysis Model Simulation of crack development caused by pulse shock

### Simulation Analysis of Collapse Process – Extended DEM

Initial state Step 1 Step 2 Step 3 Step 4 Step 5

### Coordinating Institutes in Japan

**BRI** Building Research Institute  
**Mie University**  
**NIED** National Research Institute for Earth Science and Disaster Reduction  
**GRIPS** National Graduate Institute for Policy Studies



### Facilitating Institutes in each Country

**ITB** Bandung Institute of Technology, Indonesia  
**NEC** Nepal Engineering College, Nepal  
**Preston University**, Pakistan  
**ITU** Istanbul Technical University, Turkey