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Collapse behavior of a brick masonry house using a shaking table and numerical simulation based on the extended distinct element method

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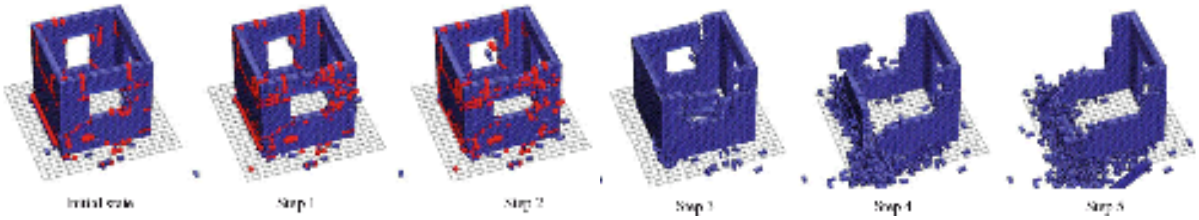
***Keywords*:** *Brick masonry, Dynamic collapse test, One-Direction horizontal shaking table, Numerical simulation, Extended distinct element method*

SUMMARY

Damage caused by devastating earthquakes has occurred in many developing countries. In order to mitigate such damage by promoting the study of adequate seismic design strategies, the authors conducted a dynamic collapse test on 3m × 3m × 3m brick masonry house constructed with Pakistani bricks, using a one-direction horizontal large- scale shaking table. In order to analyze and simulate seismic performance of the masonry structures, the authors applied a new numerical simulating method based on the Extended. Distinct Element Method (EDEM) and conducted collapse simulations of the brick masonry house behavior during the shaking table tests. In the numerical simulation model, bricks were assumed to be rigid bodies, and mortar was modeled using a mortar spring that consists of a normal spring and a shear spring. The parameters of each mortar spring were defined based on the results of material tests. Simulated results showed various collapsing processes, and the simulated aspects were found to be similar to the results of the shaking table tests.

Process of specimen collapse in the shaking table test



Collapsing process of numerical model by the Bam earthquake wave