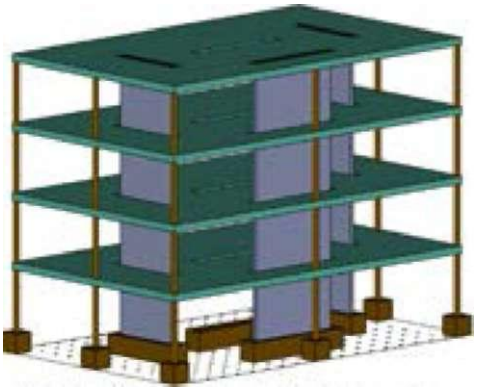
TABLE TEST FOR AN INNOVATIVE SEISMIC RESISTING SYSTEM

D. Zhang*[1], R. Fleischman[2]

1) School of Engineering, Nazarbayev University, Astana, Kazakhstan; *Dichuan.zhang@nu.edu.kz; 2) Civil Engineering Department, University of Arizona, Tucson, USA

Introduction. The research project is to produce a fidelity three-dimensional (3D) structural model based on a shake table test (Fig. 1), which is used to demonstrate performances of an innovative seismic resisting system for reducing damages to building structures under earthquakes.



I - **Schematic of test structurc.**

Methodology. This project is carried out by two steps. The first step is to interpret the test data and investigate the performance of the structure with the new seismic resisting system. To full fill this goal, the tests were conducted at two phases for structure with and without the new seismic resisting system. The second step is to calibrate a 3D model of the shake table test structure through detailed comparisons of the structural seismic responses obtained from analytical simulations using the 3D model and those observed in the shake table test. Matlab based postprocess program was used for test data visualizations. Nonlinear dynamic analysis is used for the model development. Commercial general purpose finite element software, ANSYS, has been utilized as the analysis tools.

Results and discussion. Figure 2 shows the test results of shear wall base rotation time history for one earthquake. As seen, the new seismic resisting system significantly reduces the shear wall base rotation demand. Figure 3 shows the roof displacement comparison between test data and results from analytical simulations. As seen, after going through two trial models by changing the material properties, boundary conditions and damage states, the calibrated model shows good match to the test data.

Conclusions. The structure with new seismic resisting system shows superior seismic performance than the traditional structure. A couple of key structural demands under earthquake have been significantly reduced by using the new seismic resisting system. The 3D model developed in this project shows good agreement with the test data. This model verified by the test data is qualified for parametric studies to investigate the applicability and design of the new seismic resisting system to other buildings.

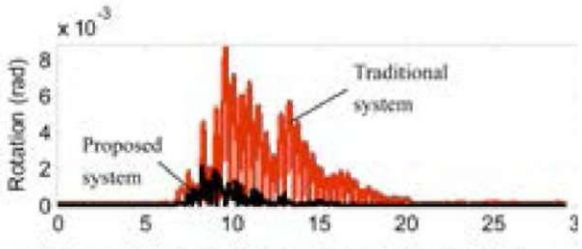


Figure 2. Test results: shear wall base rotation.

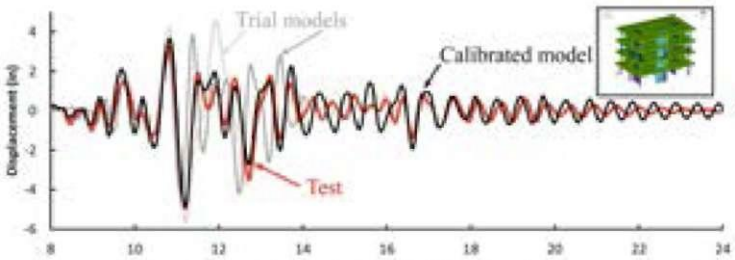


Figure 3. Tes-model comparison.