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An Investigation on the Dynamic Response of the Shaking Table's Steel Deck Using Finite Element Models

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This paper presents the results of an analytical study on the dynamic characteristics of the Shaking Table facilities at Sharif University. This 3 degree of freedom shaking table is driven by 3 servo-control hydraulic actuators, and consists of a 12 ton, 4×4×0.6 m steel deck. The main objective of this investigation is to identify the degree of flexibility of the deck, and its adverse effects in causing errors in the simulation of seismic effects on different structural specimens. Many frame specimens of different weights and configurations are subjected to seismic motions, and their responses are calculated using FE models. Some of these models were designed to account for eccentric torsion. The results indicate that the deck is generally rigid enough to simulate seismic responses within the defined degree of precision. However, it is shown that there could be some undesirable local flexibility at the base connections that in turn cause additional drift of the frame specimens. A cross shape chassis was designed to overcome this shortcoming. Further study revealed some hidden weaknesses, which were eventually resolved in the final design. It is shown that a noticeable improvement can be obtained in the simulation of seismic response by utilizing this modified chassis.