
Performance of high-performance large triaxial shaking table and vibration characteristics of floating foundations

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Due to the aging mechanical equipment of the existing large triaxial shaking table and the need to improve the table's vibration excitation capability against large-amplitude and long-period seismic motions, a plan to renovate the existing large triaxial shaking table was started in June 2021, and construction was completed in August 2024. The new table is 5m x 5m in size and has a maximum acceleration of $\pm 3G$ both horizontally and vertically (when 20 tons is loaded), a maximum velocity of $\pm 200\text{cm/s}$ both horizontally and vertically, and a maximum displacement of $\pm 60\text{cm}$ horizontally and $\pm 30\text{cm}$ vertically.

To reduce vibration propagation to surrounding facilities, the existing floating foundation was modified to match the shape of the new shaking table; furthermore, air springs and viscous dampers were added to match the shaking table's excitation performance. The vibration characteristics of the floating foundation were studied and verified in advance to ensure that there were no problems. The measurement system was equipped with synchronized recording of camera images and motion capture as well as strain and voltage sensors. For the purpose of saving labor and reducing the operator's burden during measurement, the system was designed so that the primary processing and analysis of measurement results can be performed by automatic measurement using a start signal from the control system.
