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Seismic Design Coefficients of Self-Centering Multiple Rocking Walls Subjected to Effect of Far and Near-Field Earthquakes

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Nowadays, new and innovative methods have been proposed based on damage avoidance design (DAD) philosophy systems as the alternative conventional lateral load-resistant systems. These systems reduce damage to buildings and post-earthquake reconstruction costs. The self-centering rocking walls are one of them. In this research, multiple rocking wall systems have been investigated and designed. The effect of the number of self-centering blocks and the ratio of tendon prestressing in a 12-story structure examined. The structures have examined subjected to 22 far-field records and 28 near-field records, half of which have pulse. The modeling is done in two dimensions via OpenSees software. The design coefficients of rocking sections in different prestressings for each type of ground motions are specified. The results shown that rocking wall structures under near-field pulse-like ground motions need more design capacity than other records to control drift and capacity section. Furthermore, The design of base-rocking and multiple rocking structures has been done for specific drift that have similar drift profiles in height. Then, for this case design, it is not possible to expect the desired energy absorption and also the reduction of the effects of higher modes from the multiple rocking the system compared to the base-rocking system.

Keywords: Self-centering system, Rocking wall, Residual displacement, Presressing ratio, Higher mode.

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