

## Seismic Behavior of Steel Moment-Resisting Frames for Uplift Permitted in Near-Fault Regions

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**Abstract :** Seismic performance of steel moment-resisting frame structures is investigated considering nonlinear soil-structure interaction (SSI) effects. 10-, 15-, and 20-story planar building frames with aspect ratio of 3 are designed in accordance with current building codes. Inelastic seismic demands of the superstructure are considered using concentrated plasticity model. The raft foundation system is designed for different soil types. Beam-on-nonlinear Winkler foundation (BNWF) is used to represent dynamic impedance of the underlying soil. Two sets of pulse-like as well as no-pulse near-fault earthquakes are used as input ground motions. The results show that the reduction in drift demands due to nonlinear SSI is characterized by a more uniform distribution pattern along the height when compared to the fixed-base and linear SSI condition. It is also concluded that beneficial effects of nonlinear SSI on displacement demands is more significant in case of pulse-like ground motions and performance level of the steel moment-resisting frames can be enhanced.

**Keywords :** soil-structure interaction, uplifting, soil plasticity, near-fault earthquake, tall building

**Conference Title :** ICCEE 2015 : International Conference on Civil and Environmental Engineering

**Conference Location :** Miami, United States

**Conference Dates :** March 09-10, 2015