

**Title** Effects of Soil-Structure Interaction on Seismic Responses of Tall Buildings

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### **Abstract**

Tall buildings are the recent trend in the construction industry and it involves a sequence of challenges that are to be faced to succeed in modeling, analysis, and design for specific structural systems. The most common modeling technique practiced is to fix the structure at base or at ground level, hence, soil-structure interaction (SSI) is seldom included in seismic analysis of tall buildings. Some previous studies emphasize the need to consider the SSI effects as inclusion of SSI significantly affected the vertical distribution of story drift for tall buildings and in light of producing more accurate seismic responses. One major issue with SSI in practice roots back to insufficient knowledge on basic principles of SSI and limited guidance by standards and codes. This study considers a 40-story core wall building with 4 levels of embedded basement supported by a mat foundation resting on a two-layered soil medium. Five models (one without SSI, two models with SSI as recommended by TBI (2017), and two models using direct approach was employed with equivalent linear soil. For simplicity, only the linear behavior of the structure was considered. The whole system was analyzed using time history analysis. Global responses such as story displacement, story drift, story shear, story moment and roof acceleration obtained from each model was compared and the need to study the dynamic behavior of tall building using the direct method is highlighted as it was found that the SSI modeling techniques affect seismic responses.

**Keywords** Soil-structure interaction, tall building, direct approach, substructure approach, soil modelling.