SEISMIC EVALUATION OF SQUAT REINFORCED CONCRETE SHEAR WALLS CONSIDERING SOIL-STRUCTURE INTERACTION

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This paper aimed at better understanding the seismic behaviour of squat reinforcedconcrete shear walls considering soil-structure interaction (SSI). SSI effects on squat reinforced concrete walls are studied using the substructure method.

Two types of tall and short walls are considered in this study (figure 1). All the shear walls have flanges at their ends.

Definition of short wall is: $\frac{h}{l} < 2$ and for tall wall: $\frac{h}{l} > 2$ (Eurocode 8, 2003).

L= Length of the wall and
Where, *h*=Height of the wall

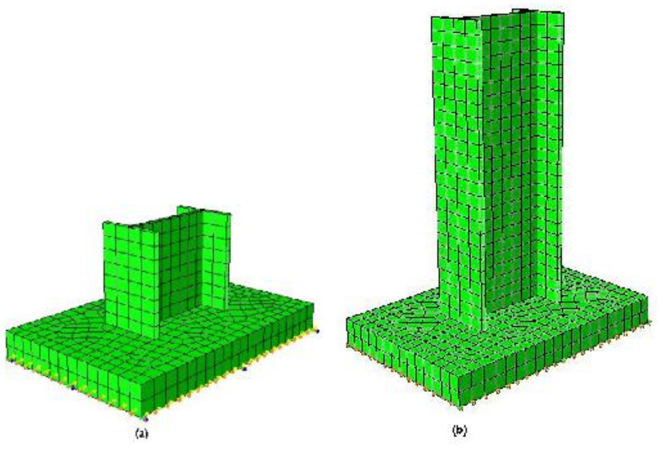

Figure 1. Finite element idealization of (a) short wall, (b) tall wall

Modeling of infinite soil media in soil–structure interaction is considered by Sub-structure approach, (Stewart et al., 1998):

$$\bar{K}_j = K_j(a_0,\nu) + i\,\omega C_j(a_0,\nu) \qquad , \qquad a_0 = \frac{r\omega}{v_s} \tag{1}$$

Three types of soil representing type II, III and IV according to classification of the Iranian Standard no 2800-05 are selected in this study as presented in Table 1.

Table 1. Properties of the soil types considered in this study (Tabatabaiefar and Massumi, 2010)

Soil type	Shear wave velocity V_s(m/s)	Elastic modulus E(kg/cm^2)	Shear modulus G_{max}(kg/cm^2)	Density Ɣ(kg/m^3)	Poisson's ratio ν
II	600	16400	6480	1800	0.28
III	320	4945	1808	1750	0.39
IV	150	935	335	1500	0.40

The linear time history analysis of the integrated structure is carried out in ABAQUS with ground motion corresponding to the longitudinal component of Kobe earthquake at Cue-Takatori with peak ground acceleration of 0.611g. The total duration of the ground motion is taken as 18 sec. Acceleration time history of this ground motion is shown in Figure 2.

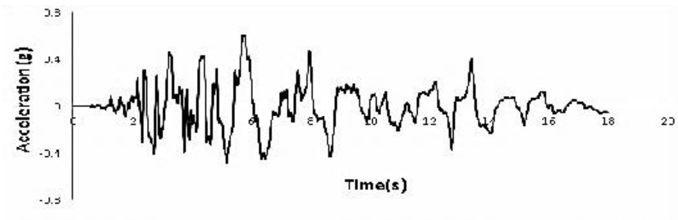

Figure 2. Time history plot of Kobe ground motion

The results showed that maximum tensions' scattering in short wall is different from tall one, (Figure 3). Moreover, considering SSI in seismic design for short case is negligible; however, for tall case especially on soil type IV is essential.

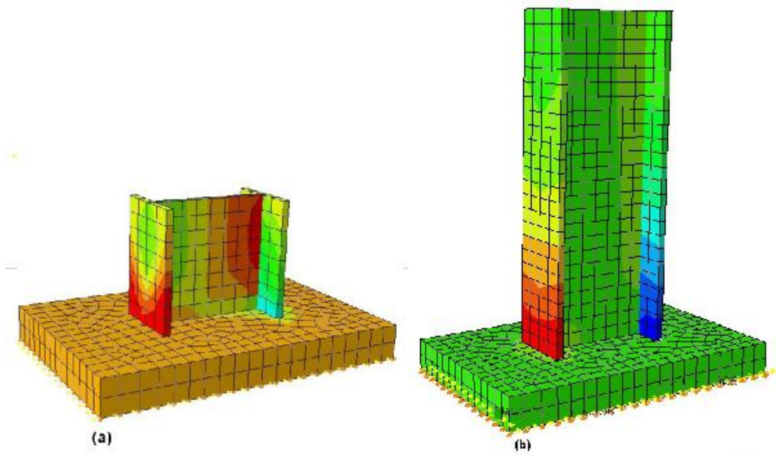

Figure 3. Contour of Maximum tension of walls with fixed base in x direction under Kobe earthquake

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