ACCELERATION RESPONSE MODIFICATION FACTORS FOR NONSTRUCTURAL COMPONENTS DUE TO NEAR-FAULT PULSE-LIKE EARTHQUAKES

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A statistical analysis of the peak SGM acceleration demands for nonstructural components (*NSC*s) supported on inelastic regular moment-resisting frame structures exposed to 40 near-field pulse like ground motions is presented. Peak component acceleration (*PCA*) demands were quantified based on the floor response spectrum (*FRS*) method with consideration of dynamic interaction effects. This study evaluated the main factors that influence the amplification or decrease of FRS values caused by inelasticity in the primary structures (ATC, 2004; Singh et al., 2006). While *FRS* values at the initial modal periods of the supporting structure are reduced due to inelastic action in the primary structure, the region between the modal periods experiences an increase in *PCA* demands. Here, acceleration response modification factor *(R*acc*)* has been proposed as a parameter to quantify this reduction/increase in *PCA* demands. The *R*acc factor is defined as the FRS for linear elastic primary structures normalized by the *FRS* for an inelastic primary structure. The terms 'elastic' and 'inelastic' refer to the behavior of the supporting structure, while elastic *NSC*s are used in this study. As it can be seen in Figure 1, linear, nonlinear and the ratio of linear/nonlinear floor response acceleration in the last floors of 4 and 8 story structures are presented. It is clear that in the stiffer structure the *Racc* is higher than the other.

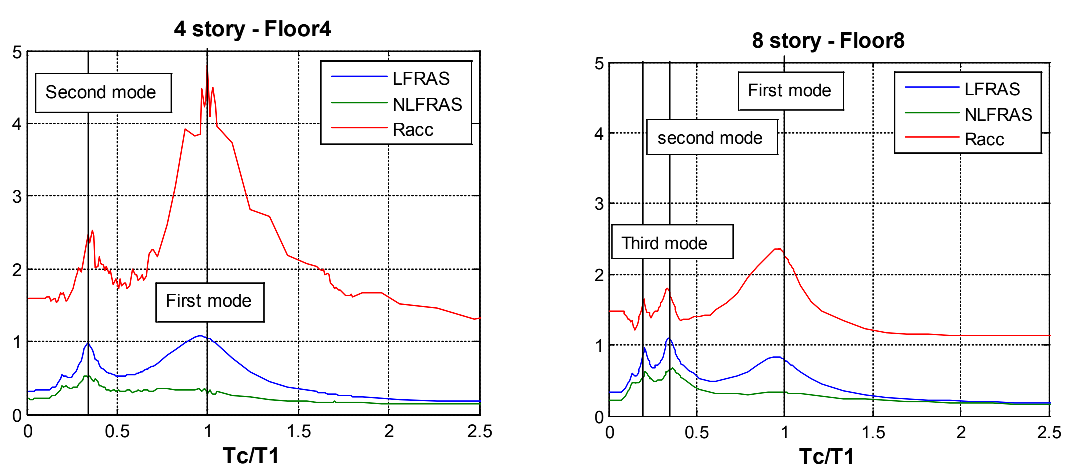

Figure 1. LFRAS, NLFRAS and Racc in last floor of 4 & 8 story buildings

This study tries to evaluate the dependence of the proposed acceleration response modification factor *(R*acc*)* on various structural parameters and characteristics (i.e. the location of the *NSC*s, period of the component and period of the supporting structure) (Miranda and Taghavi, 2005; Medina et al., 2006). This proposed factor has the potential to be used similar to strength-reduction factors for primary structures to scale the elastic *FRS* to obtain the inelastic *FRS*. The advantage of using the parameter *Racc* is that it can address both the increase and decrease in elastic FRS values due to yielding of the supporting structure. In Figure 2, *Racc* factor is compared due to the location of the NSCs (Sankaranarayanan and Medina, 2006).

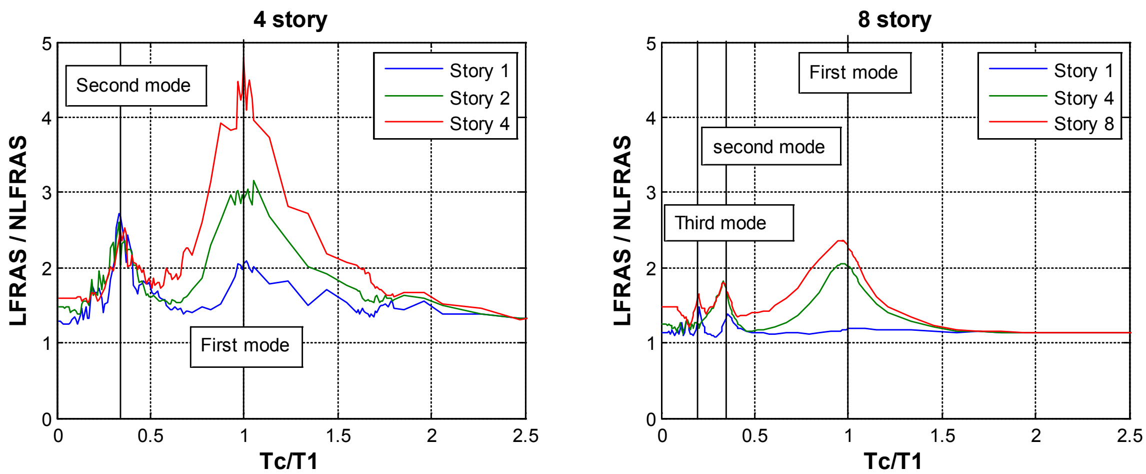

Figure 2. Racc in different floors of 4 & 8 story buildings

This observation clarifies the importance of the location of the *NSC*s and the parameter *Tc/Ti* where *Ti* is the period of vibration of the *i* th mode in the quantification acceleration demands of *NSC*s mounted on inelastic frames.

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