

EFFECT OF THE SIMULTANEITY OF EARTHQUAKE COMPONENTS IN STRUCTURES WITH TORSIONAL IRREGULARITY

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ABSTRACT

The estimation of the maximum design responses according to the Peruvian technical standard NTE E.030 is carried out considering the seismic action as unidirectional. The design spectral acceleration parameters are based on attenuation laws which use the geometric mean of the EW and NS earthquake components to define the horizontal component of acceleration, which is always less than the maximum component; hence they are on the unsafe side. Furthermore, even with the correct seismic intensity, the simultaneous action of both components may result in larger demands than those computed by considering only one component at a time. The buildings that would be most affected would be those with torsional irregularity. In this article the most used definitions of horizontal seismic component have been revised, comparing seismic records of events from subduction sources. Then, using both recorded motions and artificial records, simplified models with different degrees of torsional irregularity were analyzed, observing a clear trend in the amplification of the response regarding relative in-plan eccentricity and torsional stiffness. Following the seismic analysis of actual reinforced concrete buildings, it was concluded that the factor irregularity factor I_p , defined in the NTE E.030, does not compensate the effect of the simultaneity of the components in structures with torsional irregularity. For this reason, this work gives some recommendations to combine the results of the analysis in each orthogonal direction, both for structures with regular configuration and for those categorized as torsionally irregular.

Keywords: Torsional Irregularity, simultaneous action, in-plan eccentricity.

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