# Collapse risk assessment of a Chilean dual wall-frame reinforced concreteoffice building

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Keywords: Collapse assessment, Chilean code-conforming buildingIncremental dynamic analyses, Seismic hazard models

ABSTRACT:

Several code-conforming reinforced concrete buildings were severely damaged during the 2010 moment mag-nitude (Mw) 8.8 Chile earthquake, raising concerns about their real collapse margin. Although critical updateswere introduced into the Chilean design codes after 2010, guidelines for collapse risk assessment of Chileanbuildings remain insufficient. This study evaluates the collapse potential of a typical dual system (shear wallsand moment frames) office building in Santiago. Collapse fragility functions were obtained through incrementaldynamic analyses using a state-of-the-artfinite element model of the building. Site-specific seismic hazard curveswere developed, which explicitly incorporated epistemic uncertainty, and combined with the collapse fragilityfunctions to estimate the mean annual frequency of collapse (λc) values and probabilities of collapse in 50-years(Pc(50)). Computed values ofλcand Pc(50) were on the order of 10−5–10−4, and 0.1–0.7%, respectively,consistent with similar studies developed for buildings in the US. The results also showed that the deaggregationofλcwas controlled by small to medium earthquake intensities and that different models of the collapse fragilityfunctions and hazard curves had a non-negligible effect onλcand Pc(50), and thus, propagation of uncertainty inrisk assessment problems must be adequately taken into account.