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TESIS DE MAGÍSTER

ASSESSMENT OF THE SEISMIC PERFORMANCE OF INTEGRAL BRIDGE PIERS IN HIGH SEISMICITY REGION CONSIDERING VARIOUS EDPs

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Abstract

This study uses Incremental Dynamic Analysis (IDA) to assess seismic vulnerability in integral bridge piers. Various Engineering Demand Parameters (EDPs) like curvature, displacement, and drift offer detailed structural response insights. Pile foundations, employing advanced nonlinear springs soil modeling, include plastic hinges in columns following Caltrans guidelines. The study, following ACHISINA's Performance-Based Earthquake Engineering (PBEE) guide, compares Maximum Considered Earthquake (MCE) and Design Basis Earthquake (DBE) responses for each EDP. Curvature EDPs consistently remain below 20% in exceedance probabilities for both MCE and DBE. Notably, a nearly 25% difference is observed in Life Safety Drift Limit exceedance probabilities between DBE and MCE. Operational Drift and Plastic Displacements EDPs align with Caltrans standards. Plastic Displacement shows heightened susceptibility to significant exceedance probabilities under both DBE and MCE. Drift values with around 15% and 50% exceedance probabilities for DBE and MCE, respectively, are deemed satisfactory for seismic behavior evaluation. Stressing the importance of considering non-elastic behavior, the study recommends incorporating Drift and Curvature as crucial EDPs