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# Seismic Fragility Assessment of Aging Highway Bridge Considering Climate Change Effects

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## Abstract

Highway bridges play an important role in sustained economic growth and societal development of any country. The behavior of reinforced concrete bridges may be adversely affected by climate change due to global warming. Along with continuous exposure to unfavorable weather conditions, bridges are also susceptible to intermittent damaging earthquakes. A case-study bridge located in high seismic region is selected, and a detailed finite element model of the bridge is developed by taking into account the time-dependent corrosion deterioration effects and nonlinear behavior. The corrosion deterioration model takes into account the climate change effects to estimate the lifetime corrosion of the reinforced concrete bridge. A set of ground motions that represents regional seismic hazard are used to conduct nonlinear time history analyses. Seismic fragility curves are developed at various time-instants along the service life, taking into account aging and climate change effects. The results show that the failure probability of a deteriorated bridge increases when compared to its pristine or as built condition, indicating the significance of taking into account the climate change effects when assessing seismic vulnerability.

**Keywords:** Reinforced concrete highway bridge, Climate change, Time-dependent corrosion Deterioration, Seismic fragility