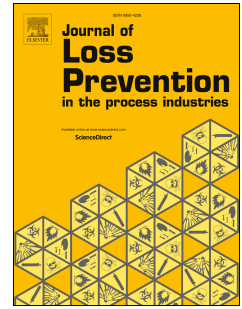


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Seismic Fragility Analysis of Elevated Steel Storage Tanks Supported by Reinforced Concrete Columns

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Abstract: This study aims to investigate the seismic vulnerability of elevated steel storage tanks rested upon reinforced concrete columns through a probabilistic seismic assessment approach. In particular, an elevated steel storage tank, which collapsed during the 1999 Kocaeli earthquake in Turkey, is considered. In this respect, in order to evaluate the earthquake performance of the tank components during earthquakes, non-linear time history analyses are conducted on a three-dimensional finite element stick model. Then, probabilistic seismic demand models incorporating uncertainty parameters for the tank components are established using two sets of ground motion records that represent the near-source and far-field characteristics of the earthquakes. Relevant fragility curves, which present the most likely damage states of the tank components, are derived using both cloud and incremental dynamic analysis methods. The efficiency and sufficiency of different ground motion intensity measures are also evaluated, leading to the conclusion that in analyzed case, the peak ground acceleration demonstrates the best performance among selected intensity measures.

Keywords: elevated steel tank, reinforced concrete column, shear behavior, fragility curve, non-linear analysis, intensity measure.

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