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Analysis of Steel Moment Frames subjected to a Vehicle Impact

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Structures are often subject to vehicle collision which can be accidental or intentional as in the case of a terrorist attack. This study investigates the performance of steel moment frames subjected to vehicle collision at a first story column through numerical simulation using LS-Dyna®. The finite element models of vehicles provided by the National Crash Analysis Center (NCAC) are used for numerical analysis. Nonlinear dynamic time history analyses are carried out with three bay steel structures subjected to a car impact in a first story exterior column. The performances of structures with different connection details subjected to impact of a car with varying speed are compared. Also investigated is the progressive collapse of the structure when the column is severely damaged due to the collision of the vehicle.

Keywords: Vehicle Collision, Progressive Collapse, FEM Analysis, LS-Dyna®