

Behavior of Steel Moment Frames Subjected to Impact Load

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Abstract : This study investigates the performance of a 2D and 3D steel moment frame subjected to vehicle collision at a first story column 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 analysis of the 2D and 3D model structures are carried out based on the arbitrary column removal scenario, and the vertical displacement of the damaged structures are compared with that obtained from collision analysis. The analysis results show that the model structure remains stable when the speed of the vehicle is 40km/h. However, at the speed of 80 and 120km/h both the 2D and 3D structures collapse by progressive collapse. The vertical displacement of the damaged joint obtained from collision analysis is significantly larger than the displacement computed based on the arbitrary column removal scenario.

Keywords : vehicle collision, progressive collapse, FEM, LS-DYNA

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