

Explication of Ultimate Behavior of Steel Members and Evaluation of Ultimate Earthquake Resistance of Steel Moment Resisting Frame

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This study evaluates the ultimate seismic performance of steel moment resisting frame on the basis of realistic ultimate behavior of members which are governed by local buckling or ductile fracture.

Ultimate behaviors of members were clarified by cyclic loading tests and numerical analyses. Numerical analyses conducted in this study are based on the results of fundamental experiments of steel plate and stub column. Moreover, the ultimate seismic performance of the steel moment resisting frames is evaluated by conducting inelastic response analyses that reflects the modeled ultimate behavior of members.

Results of the study contributed to the development of the seismic research on steel structures in the following aspects. (1) Behaviors of members were systematically clarified until losing restoring forces. (2) In case of columns which receive 2 dimensional horizontal external forces as seismic force, 2 dimensional ultimate behaviors were clarified. (3) Relationship between the ultimate seismic performance of moment resisting frame and the ultimate performance of members until losing restoring force was quantitatively estimated. (4) Not only the ultimate seismic performances of in-plane frames, but also the ultimate seismic performances of 2 dimensional frames under 2 dimensional seismic forces were examined.