

鋼構造梁柱接頭具協力桿件之耐震性能

研究生：羅仁甫

指導教授：陳誠直 博士

國立交通大學土木工程學系碩士班

摘要

美國北嶺地震及日本神戶地震後之研究顯示，鋼骨梁柱接頭在非常有限的非線性行為下以產生脆性破壞，震後的研究大都著眼於將梁柱交接面的彎矩容量提高，使塑性鉸遠離梁柱交接面。本研究尋求不同之改良方式，降低梁柱交接面處彎矩需求，利用協力桿件支撐於梁上，使梁之最大彎矩遠離梁柱接面。研究方式由理論推導著手，並進行有限元素分析，探討具協力桿件梁柱接頭模型之應力分佈情形，並設計三組實尺寸試體進行實驗，驗證其理論。

梁之降伏機制受協力桿件的彈性勁度控制，彈性勁度及其支撐位置的不同，可使梁於支撐處產生塑性鉸或是梁支撐段整段剪力降伏；可對照其有限元素分析得到與理論相似的結果。經三組實尺寸試體實驗後確實符合其理論推導。因此，採協力桿件鋼骨梁柱接頭可有效降低梁柱接面發生脆性破壞之可能性，並能夠符合國內外規範對韌性抗彎矩構架之要求。

關鍵字：梁柱接頭、協力桿件、塑性鉸、韌性

Seismic Performance of Steel Beam-to-Column Connections with Supporting Members

Student : Jen-Fu Lo

Adviser : Dr. Cheng-Chih Chen

Department of Civil Engineering
National Chiao Tung University

Abstract

During the Northridge and Kobe earthquakes, numerous beam-to-column moment connections in steel moment-resisting frames were damaged with limited nonlinear behavior. To improve the cyclic behavior of the moment connections, research conducted after the earthquakes emphasized on either strengthening the beam-to-column interface or weakening the beam section, and both improvements lead to the formation of the plastic hinge in the beam section away from the beam-to-column interface. This research, however, proposed that by utilizing supporting members the moment demand at the beam-to-column interface is reduced, so the maximum flexural moment of the beam occurs far away from the interface. Theoretical study shows that the yielding mechanism of the beam depended on the elastic stiffness of the supporting member and supporting location of beam. The beam can form plastic hinge on the beam at the supporting location or develop shear yielding within the supporting segment of the beam. The full-scale tests confirmed the behavior, and demonstrated that the proposed connections can diminish the potential brittle failure in the beam-to-column interface and develop satisfactory ductility required by the codes.

Keywords: beam-to-column connection, supporting member, plastic hinge, ductility