

Shear strength Evaluation of Hybrid Coupling Walls using Finite Element Analysis (FEA)

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Summary

Compressive stress at embedded region of steel coupling beam which is the main design parameter of HCW, is sensitive to the magnitude and locate of axial load because overturning moment is the main design load for this type of structure. The hybrid coupled shear wall joint were studied to identify the strength, stiffness and hysteretic characteristics etc. This analytic study was performed using FEA (Finite Element Analysis). For the verification of FE model, previously tested specimens were compared with analysis results. Total of variables were studied with FEA. From the analytical study higher axial load tends to increase the strength of hew connection but decrease the ductility comparing the results of this study to present guideline, evaluation of ductility and strength according to the axial load variation was carried out Suitable vertical reinforcement ratio and axial stress ratio for optimized connection design was suggested.

Keywords: steel coupling beams; Shear strength; connection; axial load; vertical reinforcement ratio

1. Introduction

The coupled shear wall is efficient structural system. That is effectively resist the horizontal force. The beams connecting individual wall piers referred to coupling beams. The coupling beam is affected by flexural and horizontal load, and which transfer shear force from wall to the other wall. Previous studies on the seismic response of coupling beams progress successful results of an improved reinforcement detailing that consists of a group of diagonal reinforcement. However, these studies demonstrated that diagonal reinforcement, larger span-to-depth was not efficient to resist shear force. In order to improve seismic performance, the use of steel coupling beams also has been investigated by many researchers, A number of recent studies have examined the seismic response of composite coupling beam-wall connections. Alternatively, many researchers have used PCI guideline. For the design of HCW, many variables should be considered, Such as embedded length of coupling beam, compressive strength of concrete and effective width of walls, etc. However in the recent studies, the axial load was reported that is significantly effect to the connection behaviour. A number of recent studies have examined the seismic response of composite coupling beams. However, no specific guidelines are available for computing the shear strength of steel coupling beam-wall connections. Alternatively, many researchers have used to PCI guideline. Main variable, axial load ratio used in connection of hybrid structure is important to estimate shear strength. As seen in study of Lee won ho, test specimens that consider axial load shear strength increase more greatly. However, Ductility decreases more reversely. Therefore, we need to consider the axial load effect to the design of Hybrid Coupled Wall connection for the more refined design procedure. Also, coupled shear wall joint's shear strength that moment rigid body