THE BEHAVIOUR OF CONCRETE FILLED THIN WALLED STEEL COLUMN UNDER CONCENTRIC LOAD

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ABSTRACT

Concrete filled steel tube (CFT) column is a structural system with excellent characteristics structurally and economically as compared to other types of column system. The enhancement of CFT structural behaviour is contributed by the confinement effect provided by the steel tubes to the concrete core. The confinement effect is very effective in circular cross-section as compared to rectangular or square cross-sections. Therefore, stiffening measures are normally employed when square or rectangular tubes are used, especially for thin walled steel section. This study was looking at the potential of utilizing concrete filled square thin walled steel section with a newly proposed stiffening system as structural composite column. The effectiveness of the proposed stiffening system in terms of strength and ductility was studied experimentally on 47 numbers of short CFT columns, when subjected to axial concentric load. The stiffness rigidity, different cross-section shape and different loading conditions are the main parameters studied in this project. The stiffening system was observed to contribute largely to the load bearing capacity of concrete filled thin walled steel short column. The effect of increasing the stiffness rigidity has a significant influence in square specimens but only moderate effect on octagonal specimens. It was also found that the highest ultimate strength obtained when the CFT column was loaded on entire sections. Generally, the proposed stiffening method can improve the ultimate strength capacity of concrete filled thin walled tubes provided the stiffeners are adequately designed.