Parametric Study of Fire Performance of Concrete Filled Hollow Steel Section Columns with Circular and Square Cross-Section

ABSTRACT

Concrete filled hollow steel section column have been widely accepted by structural engineers and designers for high rise construction due to the benefits of combining steel and concrete. The advantages of concrete filled hollow steel section column include higher strength, ductility, energy absorption capacity, and good structural fire resistance. In this paper, comparison on the fire performance between circular and square concrete filled hollow steel section column is established. A threedimensional finite element package, ABAQUS, was used to develop the numerical model to study the temperature development, critical temperature, and fire resistance time of the selected composite columns. Based on the analysis and comparison of typical parameters, the effect of equal cross-sectional size for both steel and concrete, concrete types, and thickness of external protection on temperature distribution and structural fire behaviour of the columns are discussed. The result showed that concrete filled hollow steel section column with circular cross-section generally has higher fire resistance than the square section.