Shrinkage and Creep of Mega Concrete Filled Steel Tubular Column in Super Tall Steel Building

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Abstract

Concrete filled steel tubular column (CFT) is popular in super tall building, since it has many advantages compared with ordinary steel or reinforced concrete system. CFT column is a combination of two traditional structural forms: steel tube and concrete filled in the hollow steel tube. It takes many researchers on the load carrying capacity of this composite member. However, not much has been done in relation to their time-dependent behavior especially for mega concrete filled steel tubular column employed in super tall steel buildings. In order to estimate the effects of shrinkage and creep of CFT column during the construction period, B3 model was applied to revealing the time-dependent behavior. The calculation results are compared with experiments. Then a real super tall steel building was employed to illustrate the shrinkage and creep of mega CFT column. The results show that the creep takes a significant effect on the column shortening during the construction. The value of shrinkage deformation is actually small and can be negligible in design.

Keywords: super tall steel building; concrete filled steel tubular column; shrinkage and creep; construction sequential analysis.

1 Introduction

The use of concrete filled steel tubular column in super tall buildings has become increasingly popular in recent times. These structural elements are well used in areas prone to earthquake excitation, and are efficient because of the increased concrete strength due to the confinement provided by the steel tube. It not only proves to be cost-effective, but also improves the structural aesthetics. Most of the investigations were focused on the load carrying capacity of this composite member [1]. And studies on the shrinkage and creep were always related to the column with small size [2-3]. Not much effort has been done in the time dependent

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