

Numerical Study on Square Large Sectional Concrete-Filled Steel Tubular Columns with Separating Cross Steel Plate

Wencong Li

Toyo University, Kawagoe, Japan

Contact: li051@toyo.jp

Abstract

To meet the demand of structural performance of the tomorrow's supertall buildings, square large sectional concrete-filled steel tubular columns with separating cross steel plate were proposed. In this research, numerical studies on the square large sectional concrete-filled steel tubular columns with separating cross steel plate under lateral force in two different directions are carried out to investigate the effect of loading direction on the inelastic behavior of this kind of column. Numerical results show that there is no significant difference in the initial flexural stiffnesses of the proposed square large sectional concrete-filled steel tubular columns with separating cross steel plate in two different loading directions, but there is a certain degree of difference in their flexural strengths.

Keywords: Mega CFT column; separating cross steel plate; different loading direction; numerical study; supertall building.

1 Introduction

In order to satisfied structural demand of supertall building with increase of the structural height, concrete-filled steel tubular column (abbreviated as CFT column hereinafter) with separating cross steel plate shown in Figure 1 was proposed [1]. For this kind of multi-cell CFT column, if the lateral force loading direction is different, the seismic performance may also be different. In order to apply this kind of multi-cell CFT column to the tomorrow's supertall buildings, it is necessary to clarify the seismic performance of the multi-cell CFT column under lateral force in different directions in consideration of uncertainty in the direction of earthquake ground motion.

In this research, numerical studies on the square large sectional CFT columns with separating cross steel plate under lateral force in two different directions are carried out to investigate the effect

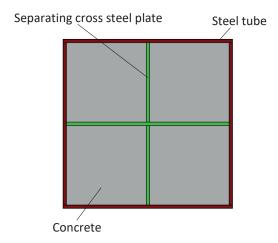


Figure 1. Cross section of concrete-filled steel tubular column with separating cross steel plate

of loading direction on the inelastic behavior of the multi-cell CFT column using the finite-element analysis platform of OpenSees [2].