Numerical study on multi-cell CFT column under lateral force in different direction

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Abstract

To meet the demand of structural performance of the tomorrow's supertall buildings, multi-cell CFT column with double-layer circular steel tubes was proposed. In this study, numerical studies on the multi-cell CFT column with double-layer circular steel tubes 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. The results show that there are no significant differences in the initial flexural stiffness and flexural strengths of the proposed multi-cell CFT column with double-layer circular steel tubes between the two different loading directions.

Keywords: Multi-cell CFT column; CFDLT column; different loading direction; numerical study; supertall building.

1 Introduction

In order to satisfied structural demand of supertall building with increase of the structural height, multi-cell concrete-filled steel tube (abbreviated as multi-cell CFT hereinafter) column with double-layer circular steel tubes 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 forces in different directions consideration of the directional uncertainty of earthquake ground motion.

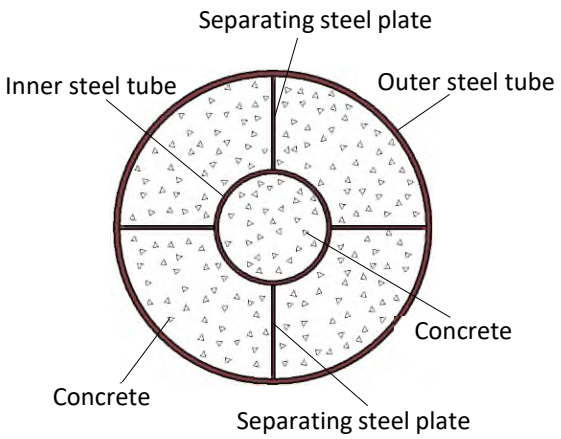

Figure 1. Cross section of multi-cell CFT column with double-layer circular steel tubes

In this study, numerical studies on the multi-cell CFT column with double-layer circular steel tubes under lateral forces in two different directions are carried out to investigate the effect of loading direction on the inelastic behavior of the multi-cell CFT column using the finite-element analysis platform of OpenSees [2].

2 Specimens

Eight column specimens are planned in this study. In each specimen, diameter of the column is 7.5 m

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