

Analysis of Rectangular Concrete-Filled Double Skin Tubular Short Columns with External Stainless Steel Tubes

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Abstract : Concrete-filled double skin steel tubular (CFDST) columns could be utilized in structures such as bridges, high-rise buildings, viaducts, and electricity transmission towers due to its great structural performance. Alternatively, lean duplex stainless steel has recently gained significant interest for its high structural performance, similar corrosion resistance and lower cost compared to the austenitic steel grade. Hence, this paper presents the nonlinear finite element (FE) analysis, behaviour and design of rectangular outer lean duplex stainless steel (EN 1.4162) CFDST short columns under compression. All classes of the outer rectangular hollow section according to the depth-to-thickness (D/t) ratios were considered. The results showed that the axial ultimate strength of rectangular CFDST short columns increased linearly by increasing the concrete compressive strength, while it does not influence when changing the hollow ratios. Finally, the axial capacities were compared with the available design methods, and recommendations were conducted for the design strength of this type of column.

Keywords : concrete-filled double skin columns, compressive strength, finite element analysis, lean duplex stainless steel, ultimate axial strength, short columns

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