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Compressive Strength of Concrete-filled thin steel stubs: Theoretical and experimental Study

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This paper suggests a practical method for predicting the strength of thin steel and composite concrete-filled stubs under compressive loading. Based on predefined strengths of steel and concrete gathered from literature data survey, the strength of steel or composite stub section is evaluated as a function of B/T ratio of the studied section and the loading mode. The method was validated using experimental results obtained in this investigation and from literature. The main studied parameters were: the steel cross section slenderness B/T which varied from 20 to 100 and two loading modes: composite loading where steel and concrete are loaded and by loading concrete core. Ordinary steel and concrete were used. Good agreement was obtained between theoretical and experimental results. Composite stubs with composite loading mode had a global strength index close to 1. Which means better performance as the composite action delayed local buckling that took place in most tested empty steel stubs. Loading the concrete core gave more ductile behavior but lower strength. This is explained by the restraining feature offered by the steel wall which puts the concrete core in a tri-axial stress state. By comparing theoretical, experimental and EC prediction it was found that the EC3 ceases to predict at a B/T ratio of 33 for steel hollow stubs and 25 for I shaped steel stubs. EC4 prediction was in good agreement with theoretical and experimental results up to B/T ratio of 100 for composite stubs.

Biography

Jahid Zeghiche is an Associate Professor at Civil Engineering Department, University of Al-Baha, KSA. He was Head of Civil Eng. Dept. at Annaba University, Algeria since 1989 he teaches steel structures and conducted many research work in the field of composite steel and concrete columns. He published many articles in established journals. He supervised many Thesis for the degree of Master and Doctorate. He got a long experience in directing many Design Offices in the city of Annaba, Algeria. He is an active person to promote the use of composite structures to overcome many seismic problems in Algeria. He temporarily teaches at Al-Baha University, since 2008.

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