An overview of numerical studies on flexural performance of built-up cold-formed steel beam (CFSB) filled with concrete

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ABSTRACT
Cold-formed steel (CFS) built-up sections have been recently introduced with other materials such as concrete connected by means of bolting and screws to avoid the problems of the CFS sections buckling. The flexural analysis of CFS-concrete composite beam is more complicated in terms of design and failure mode. Therefore, this paper attempts a short review on the numerical studies of CFS section with and without concrete under the flexural load. In particular, the CFS buckling failure modes were critically reviewed. Furthermore, the important considerations such as material properties definition and interactions during the numerical simulation were discussed. The review presented in this paper highlights considerable potential on how the nonlinearities of the concrete material, CFS-concrete interaction and connection types affect the level of simulation accuracy in predicting the flexural behavior of the composite beam. Moreover, the connections type, the nonlinear simulation methods and strategies and findings for the CFS-concrete flexural behavior were critically reviewed. The directions of the future research were provided through the concluded remarks and recommendations in achieving a higher accuracy of simulation results as well as more effective design philosophy in future to promote the utilization of CFS composite beam in construction industry.

KEYWORDS
CFS sections; Bolting connections; Concrete; Flexural behavior; Interactions; Numerical simulation

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