

Retrofitting of post-heated R.C. columns using steel fiber reinforced self-compacting concrete jackets

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Abstract

This work aims to examine the effectiveness of using steel fiber-reinforced self-compacting concrete (SFRSCC) jackets in retrofitting RC columns subjected to high temperatures. In order to do that, eleven RC columns were cast and tested under axial loading. One column served as an unheated control column, and ten columns were heated to 400 °C and 600 °C for two hours. Subsequently, eight columns were retrofitted using SFRSCC jackets. The volume fraction of steel fibers and the thickness of the SFRSCC jackets were the main parameters considered for the retrofitting technique. According to the experimental findings, SFRSCC jackets can significantly enhance the structural performance of post-heated columns as evaluated by failure load, stiffness, and toughness. The percentage increase in the failure load, stiffness, and toughness of retrofitted post-heated columns is greatly impacted by the thickness of the SFRSCC jackets. The retrofitted columns with 25 mm and 50 mm SFRSCC jackets increased their failure load by 63.9% and 211.8%, respectively, relative to that of the heated control column at 600 °C. It is obvious that the failure load of the retrofitted columns was not significantly impacted by increasing the volume fraction of steel fiber in the SFRSCC jackets. Finally, a proposed design equation was suggested to predict the failure load of retrofitted post-heated columns with SFRSCC jackets.