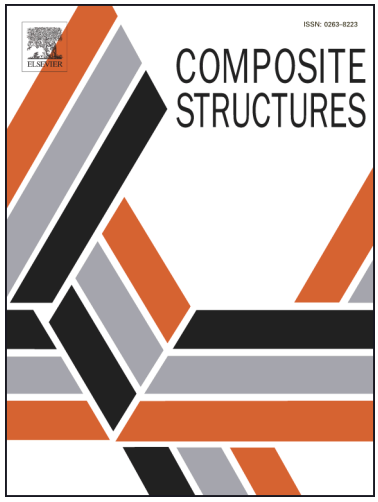

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ABSTRACT

This paper presents the results of an experimental study together with the first finite element (FE) model for the compressive behavior of fiber-reinforced polymer (FRP)-confined steel fiber-reinforced concrete (SFRC). 73 existing experimental test results of FRP-confined and actively confined SFRC specimens tested under axial compression were initially assembled. Additional axial compression tests were conducted on 16 actively confined SFRC specimens to address the gaps in the existing test database to compile a reliable database for the FE modeling of FRP-confined SFRCs. The analysis of experimental test results revealed that the compressive behavior of FRP-confined SFRCs is influenced by the steel fiber volume fraction and aspect ratio. New expressions were developed for the hoop rupture strain of the FRP jacket, axial strain-lateral strain relationship of FRP-confined and actively confined SFRC, and relationship between the confining pressure and the compressive strength of actively confined SFRC by considering the influences of the volume fraction and aspect ratio of internal steel fibers. A recently developed concrete damage-plasticity model, which was shown to be the most accurate currently available model for confined plain concrete, was adopted for the prediction of the compressive behavior of FRP-confined SFRC. The failure surface and flow rule of the model were modified based on the results from actively and FRP-confined SFRC. The results show that model predictions of the axial stress-axial strain, lateral strain-axial strain, axial stress-volumetric strain, plastic volumetric strain-axial plastic strain, and plastic dilation angle-axial plastic strain relationships are in good agreement with

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