

ABSTRACT

Fiber Reinforced Polymer (FRP) or Fiber Reinforced Plastics have been widely utilized in civil infrastructures due to their unique properties. The advantages of FRP composites include superior strength or stiffness to weight ratio, ductile form in design, and sustained chemical inertness in most civil environments. However, the behavior mechanism of the FRP jacketing in reinforced concrete column is not yet fully understood. The current design of FRP confined concrete retrofit jacketing system is still limited to the experimental results of transversely reinforced steel in concrete confinement.

In this study, more than 200 concrete stub columns with composite jackets have been tested under axial compression. Experimental parameters include plain concrete strengths, types of composites, and jacket thickness. Axial and transverse strain responses were investigated. The confinement coefficient k was obtained from the test results, based on the Rechart equation. Hence a constitutive model of confined concrete is proposed and shown to compare well with the test results from previous studies by other researchers.

The overall goal of this research is to create a universal model of confined concrete through an analytical approach and intensive experimental studies. The proposed model is suitable not only for FRP jacketing but also steel confined concrete. Based on this model, concrete column confined with FRP or steel jackets can be predicted by a numerical method.