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UTILIZATION OF ADVANCED COMPOSITE MATERIALS
IN CONCRETE STRUCTURES

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ABSTRACT

Application of advanced composite materials to concrete structures has significantly increased over the last few years. In this study, an analytical procedure capable of predicting the flexural response of beams and plane frames incorporating FRP has been developed. The formulations performed allow standard element stiffness method to be used in a nonlinear course by introducing secant stiffness factors. An iterative solution process, using layered element approach, is carried out in determining effective member stiffness. The analysis takes into consideration nonlinear material stress-strain relationship, tension stiffening effects and concrete cracking.

Predictions including load-deflection response, load-carrying capacity and mode of flexural failure are compared with 40 test results. The predictions compare very well.