THEORETICAL STUDY FOR R.C. COLUMNS STRENGTHENED WITH GFRP WITH DIFFERENT MAIN STEEL RATIO

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Abstract

It becomes a common practice to strength and repair reinforced concrete columns by wrapping them with GFRP sheets. The aim of this research is to develop a formula to describe the relation between the gain of strength of reinforced concrete square columns, their longitudinal reinforcement and number of warped layers of GFRP sheets. The research is based on simulating loading tests of a set of 12 reinforced concrete columns with different reinforcement ratios and different number of warped layers of GFRP sheets using ANSYS software. The outputs of the ANSYS models are verified using experimental tests results carried out by the author in earlier research. The results of the study are used to develop a proposed formula to correlate the axial capacity of the warped square RC column with its reinforcement ratio and the confining stress caused by the sheets. Values from both proposed formula design and formula of Egyptian Code of Practice (ECP) are compared with ANSYS outputs and experimental results. The final conclusion is that gained strength due to confining equals to (confining stress / Fcu).

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