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Comparison of the Behavior of FRP Rebar with Steel Rebar in Reinforced Concrete Columns under Impact Loading

The aim of this paper is to dynamic analyses of rectangular columns using different types of Fibre-reinforced plastic (FRP) rebars (CFRP-AFRP-GFRP) and compare them with steel rebars under impact loading. For this purpose, first, to evaluate the effect of FRP, the 25 cm column with 12mm rebars are placed under three types of impact loads in near the base, middle and the whole column. Then, to evaluate the reinforcement size effect, 12 mm rebars is replaced with 18 mm and the effect of the impact load on the whole column is evaluated. In the next step to evaluate the effect of cross sectional dimensions, the impact load across the column with the rectangular cross sectional with 35 cm dimensions will be examined. Finally, 20 models are prepared and examined by the finite element method and the results related to displacement, stress and energy are calculated. The results show that FRP reinforcements are more resistant to impact load than steel reinforcements and CFRP polymer reinforcement has performed better than other existing reinforcements. In general, it can be said that the use of Fibre-reinforced plastic reinforcement can be a measure to strengthen structures against impact load.

Keywords: Concrete Column, Impact load, Rebar, CFRP, AFRP, GFRP.

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