ملخص البحث رقم (7)

العنوان باللغة الإنجليزية:

Performance of rubberized reinforced concrete columns at ambient and high temperatures

الملخص باللغة الإنجليزية:

The proliferation of discarded rubber tires is rapidly increasing at a concerning pace. Driven by the significant movement towards promoting environmental sustainability and mitigating the adverse environmental impact associated with non-biodegradable waste rubber tires, the objec tive of this study is to identify a viable and ecologically responsible resolution to the issue of discarded tires. This study experimentally focuses on the structural response and load-carrying capacity of reinforced concrete (RC) short columns containing crumb rubber as a partial replacement for fine aggregate after being exposed to temperatures of 27 ◦C, 300 ◦C, and 500 ◦C. Four concrete mixes were produced in which the natural fine aggregate (NFA) was partially replaced by CR with ratios of 0%, 5%, 10%, and 20% in volume. Twelve columns (three columns from each mix) were cast and tested under concentric loading. The experimental results showed that the workability and compressive strength of the concrete mixes decreased with increasing the CR replacement ratio. The residual failure load of columns decreased with increasing CR quan tities and heating temperatures. The CR quantity had a more considerable impact on the decline of the column capacity than the heating temperatures. Analytical equations from international standards ACI 318–14, CSA A23.3, and previously existing equations were applied to study the validity of these equations in predicting the failure load of heated rubberized RC columns. Finally, a proposed equation for predicting the failure load of the columns is developed. The predicted failure loads obtained from the proposed equation were compared to the experimental results. The predictions from the proposed equation were in good agreement with the experimental data. Different statistical tests were done to compare the predictions from the proposed equation and previously existing equations for predicting the failure load of heated rubberized RC columns.

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