عنوان مقاله:

Prediction of the Failure Time of Glass Fiber Reinforced Plastic Reinforced Concrete Beams under Fire Conditions

محل انتشار:

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خلاصه مقاله:

A model is proposed to predict the time to failure of reinforced concrete beams in a fire. The model is developed specifically to predict the lifetime of beams reinforced with glass fiber reinforced plastic rebar, but is applicable to beams with any form of reinforcement. The model is based on the calculations for flexural capacity and shear capacity of beams embedded within ACI design codes where time and temperature dependent values for rebar modulus and strength and concrete strength replace the static design values. The base equations are modified to remove safety factors and where necessary the temperature induced reductions in strength for concrete and steel are derived using the equations presented by Eurocode 2. In order to validate the model it was used to predict to predict the failure times steel reinforced beams that had been documented in the literature. There was excellent agreement between the model and the reported lifetimes for these conventional beams. The model was applied to predict the lifetimes of that the failure mode of the beams would be because of the rebar rupture as opposed to the design condition of concrete crushing and this confirmed by the experimental test results. The model provided reasonable agreement with experimental results with a lifetime of 108 min predicted based on flexural failure and 94 and 128 min observed in the .experiments

کلمات کلیدی:

Concrete beams, Models, Fires, Predictions, Failure