International Journal of Civil Engineering (IJCE)
ISSN(P): 2278-9987; ISSN(E): 2278-9995
Vol. 3, Issue 5, Sep 2014, 7-16

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

PERFORMANCE AND DAMAGE ASSESSMENT OF REINFORCED CONCRETE SLAB EXPOSED TO ELEVATED TEMPERATURE

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ABSTRACT

Numerical investigation was carried out to study the behavior of simply supported slab using finite element method software ABAQUS. The validation of this model was based on Gordon M.E. Cooke [(2)]. The analysis was carried out for ISO 834 standard fire curve for 90 minutes of exposure on bottom side of reinforced cement concrete. The other important parameters considered here were depth of slab, diameter of reinforcement with constant spacing, with and without live load of 1.5 kPa. The temperature distribution along the depth of the slab, temperature variation of the steel reinforcement, vertical deflection and percentage of damage were studied. A result of numerical studies indicates that the distribution of temperature along with the slab depth is nonlinear, the temperature gradients are large, the stiffness of the slab found to decrease as temperature increase with time. The increase in thickness of slab and diameter of reinforcement shows same pattern of decrease in stiffness. The stiffness was found to be decreased in higher rate when considering live load also. The slab supported on four sides was found to behave in more promising manner due to better redistribution of forces and formation of double curvature than the two side supported slab. The maximum damage percentage was found to be 68% and 94% for four sided supported slab and two sided supported slab respectively for a time period of 90 minutes.

KEYWORDS: Concrete, Damage, Elevated Temperature, Live Load, Reinforcement, Residual Strength, Slab