4. Analytical and Experimental Study on Estimating the Compressive Strength of Early Age Concrete by the Maturity Method

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In order to expedite the construction process, it might be essential to estimate the early age (less than 1 day) strength of concrete subjected to various temperatures and curing methods for the construction of mountain tunnels. However, the relationship between various curing temperatures and the strength development of concrete at a very early stage is not completely understood, and the current approaches might not be able to predict the compressive strength of concrete at an early age. In order to establish a relationship between early age compressive strength of concrete and concrete maturity while taking varied temperature histories of concrete curing into account, numerical and experimental study has been carried out in this study. The results obtained from the numerical analysis and experimental study were in good agreement. Finally, to predict the very early-age compressive strength of lining concrete, different equations have been proposed in this study for different water to cement ratio. This study will be helpful to predict the early age compressive strength of lining concrete.

Keywords: Lining concrete, concrete maturity, FEM analysis, early age