

Optimization in the Compressive Strength of Iron Slag Self-Compacting Concrete

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Abstract : Sand as fine aggregate for concrete production needs a feasible substitute due to several environmental issues. In this work, a study of the behavior of self-compacting concrete mixtures under replacement of sand by iron slag from 0.0% to 50.0% of weight and variations of water/cementitious material ratio between 0.3 and 0.5 is presented. Control fresh state tests of Slump flow, T500, J-ring and L-box were determined. In the hardened state, compressive strength was determined and optimization from response surface analysis was performed. The study of the variables in the hardened state was developed based on inferential statistical analyses using central composite design methodology and posterior analyses of variance (ANOVA). An increase in the compressive strength up to 50% higher than control mixtures at 7, 14, and 28 days of maturity was the most relevant result regarding the presence of iron slag as replacement of natural sand. Considering the obtained result, it is possible to infer that iron slag is an acceptable alternative replacement material of the natural fine aggregate to be used in structural concrete.

Keywords : ANOVA, iron slag, response surface analysis, self-compacting concrete

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