

Abstract

Nabil H Al-Ashkar

Evaluation of Mechanical Properties of Self Consolidating Concrete

•Recently, all over the world, one of the main solutions for achieving higher quality concrete is the use of Self Consolidating Concrete (SCC). This investigation introduces an experimental program, consisting of 15 different SCC mixtures, aiming at studying the mechanical properties of SCC through compressive strength, splitting tensile strength, and the flexural strength. The main parameters investigated in this study were: lime stone powder as an addition, silica fume as a replacement of the cement content, coarse aggregate size, and coarse to total aggregate ratio. The relationships between the studied properties were suggested in this study and compared to the other models suggested by international codes to enhance our understanding of the behavior of SCC. The results indicated that the optimal percent of lime stone powder to be used in SCC is 20% though it might introduce some slight reduction in cube compressive strength. It is also found that the replacement of 10% of cement content by silica fume greatly enhanced the mechanical properties examined in this investigation. The use of smaller sized coarse aggregate (10 mm) produced better performance than the larger coarse aggregate (20 mm). Moreover it was concluded that the international codes studied here underestimate the tensile strength calculated from the corresponding compressive strength when applied to the SCC. However, the CEB-FIP model to estimate the tensile strength from the flexural strength for normal concrete overestimates the tensile strength for SCC. Different models were suggested in this investigation but need further validation.