

Application of nano silica and GGBS on bond strength of ternary concrete

Dhruv Shah #, Manank Shah, Niragi Dave, Kaushal Vora

Department of Civil Engineering, Pandit Deendayal Petroleum University, Gandhinagar, 382007, India.

#Email: Dhruv.scv15@sot.pdpu.ac.in

Abstract: Bond Strength and bond slip behavior between concrete and reinforcing steel are important parameters to determine the performance of any concrete. Bond Strength behavior is extensively studied for the structural RC members but very few studies shows the effect of Nano Technology on the cohesiveness or bond between the concrete and the reinforcing bars. An attempt was made to study the bond strength of the ternary concrete when Ordinary Portland Cement is replaced by 50 % mineral admixture, Ground Granulated Blast Furnace Slag (GGBS) and gradually increasing percentage of Nano Silica (NS) from 1 % to 5 %. 16 mm reinforcing bars were used for the study. The bond strength analysis was performed as per the displacement control system and the standard rate was kept at 0.025mm/sec. The shear bond failure was predominantly observed at the time of the testing of cubes. All the experimental practices are performed as per the IS code provisions. The results of bond strength of concrete with 50% constant replacement of OPC by GGBS and varying percentage of replacement of Nano Silica (1, 2, 3, 4, 5 percentage) are compared. It can be concluded from the experiments that the mix (50 % GGBS + 47 % OPC + 3 % NS) yielded the maximum bond strength as compared to all mixes. The results, when compared with the bond strength of primitive concrete with no replacement of OPC, are found to be promising.