

Effect of Bentonite on the Rheological Behavior of Cement Grout in Presence of Superplasticizer

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Abstract : Cement-based grouts has been used successfully to repair cracks in many concrete structures such as bridges, tunnels, buildings and to consolidate soils or rock foundations. In the present study, the rheological characterization of cement grout with water/binder ratio (W/B) is fixed at 0.5. The effect of the replacement of cement by bentonite (2 to 10 % wt) in presence of superplasticizer (0.5 % wt) was investigated. Several rheological tests were carried out by using controlled-stress rheometer equipped with vane geometry in temperature of 20°C. To highlight the influence of bentonite and superplasticizer on the rheological behavior of grout cement, various flow tests in a range of shear rate from 0 to 200 s⁻¹ were observed. Cement grout showed a non-Newtonian viscosity behavior at all concentrations of bentonite. Three parameter model Herschel-Bulkley was chosen for fitting of experimental data. Based on the values of correlation coefficients of the estimated parameters, The Herschel-Bulkley law model well described the rheological behavior of the grouts. Test results showed that the dosage of bentonite increases the viscosity and yield stress of the system and introduces more thixotropy. While the addition of both bentonite and superplasticizer with cement grout improve significantly the fluidity and reduced the yield stress due to the action of dispersion of SP.

Keywords : rheology, cement grout, bentonite, superplasticizer, viscosity, yield stress

Conference Title : ICCMME 2014 : International Conference on Chemical, Materials and Metallurgical Engineering

Conference Location : Istanbul, Türkiye

Conference Dates : November 28-29, 2014