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J.J. Chen, P.L. Ng, L.G. Li, A.K.H. Kwan

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Use of Superfine Zeolite in Conjunction with Silica Fume - Effects on Rheology and Strength of Cementitious Paste

J.J. Chen ^{a*}, P.L. Ng ^{b,c}, L.G. Li ^d, A.K.H. Kwan ^c

^a Department of Civil Engineering, Foshan University, Foshan, China

^b Faculty of Civil Engineering, Vilnius Gediminas Technical University, Vilnius, Lithuania

^c Department of Civil Engineering, The University of Hong Kong, Hong Kong, China

^d School of Civil and Transportation Engineering, Guangdong University of Technology,
Guangzhou, China

Abstract: In this research, the use of superfine zeolite (SZ) in conjunction with silica fume (SF) in cementitious paste was investigated. A number of cementitious paste samples with different amounts of SZ and SF and varying water/cementitious materials ratios were produced for testing of flowability, cohesiveness, 7-day, 28-day and 70-day compressive strengths, packing density and water film thickness (WFT). The test results showed that in the presence of SF, the addition of SZ as cement replacement would decrease the flowability, increase the cohesiveness, increase the packing density, decrease the WFT, decrease the early-age strength and increase the long-term strength. In-depth analysis revealed that the SZ and SF exerted their influences on the rheology mainly through the corresponding changes in WFT. Moreover, the cementing efficiency of the SZ for 70-day strength was higher when added in conjunction with SF than when added alone revealing certain synergistic effect of the combined addition of SZ and SF on long-term strength.

Keywords: cementing efficiency, packing density, rheology, silica fume, superfine zeolite, water film thickness.

* Corresponding author. Tel: (86) 13450891042

Email address: chenjjajian@fosu.edu.cn (Dr. J.J. Chen)

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