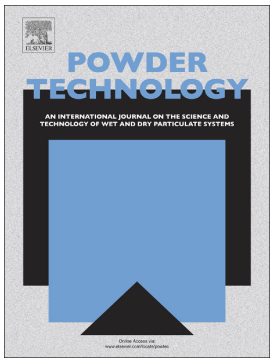

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Yanrong Zhang, Xi Luo, Xiangming Kong, Fazhou Wang, Liang Gao

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Rheological properties and microstructure of fresh cement pastes with varied dispersion media and superplasticizers

ZHANG Yanrong[1, 2*], LUO Xi[1], KONG Xiangming[2], WANG Fazhou[1], GAO Liang[2]

1. State Key Laboratory of Silicate Materials for Architectures, China
2. School of Civil Engineering, Beijing Jiaotong University, Beijing, 100044, China
3. Department of Civil Engineering, Tsinghua University, Beijing, 100084, China

Correspondence to: ZHANG Yanrong

Tel: +86-10-51687244

Email: yr.zhang@bjtu.edu.cn

Abstract: The effects of dispersion media and superplasticizers on the rheological properties and microstructure of fresh cement pastes (FCPs) were investigated to reveal the acting mechanism of tuning rheological properties. Different dispersion media including ethanol, water and their mixtures, and various superplasticizers with varied charge types were considered. Measurements on rheological properties, particle size and zeta potential of FCPs were carried out. Morphologi G3 microscope was adopted to observe the organization structure of cement grains in suspensions. Results indicate that different dispersion media can lead to notable changes on the microstructure and the rheological properties through significantly altering the charge characteristic of cement surface. There is a strong positive relationship between the zeta potential of FCPs and their microstructure and rheological properties, i.e., higher zeta potential influences superior dispersion state of cement grains and stronger rheological properties of the FCPs. On the other hand, superplasticizers can increase the dispersion degree of cement grains and further enhance the rheological properties of the pastes by adsorbing on cement surface. Anionic superplasticizer with the strongest adsorption capability brings about the largest dispersion degree of cement grains and the highest rheological properties of the FCPs. As anionic superplasticizer is included in the mixture of ethanol and water, the