

Nanosilica modified concretes (Nanocomposites and nanomaterials)

Effect of different application method on rheological properties of nanosilica modified concretes

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Nanosilica as a cement-based composites additive exhibits tremendous properties which can affect positively variety of properties of concrete and cement mortar [1]. The uniform dispersion of nanoparticles in the cement matrix is a key issue in their application in the field. Due to high surface area to volume ratio of nanosilica particles (nSiO₂) can highly affect the workability of concretes [2]. Overcoming this obstacle is essential if nanosilica would like to be applied in self-compacting concretes (SCC) or heavyweight concretes (HWC). Therefore, influence of three incorporating methods of nanosilica spheres (1 wt% and 3 wt%) on rheological properties of cement pastes has been examined.

It was observed that in all tested methods the presence of small amounts of silica nanoparticles (1 wt%) slightly affect the rheological properties of the cement pastes such as yield stress and plastic viscosity. However, the addition of 3 wt% can significantly change the rheological properties of cement composites which may result in noticeable reduction in liquidity and difficulties in achieving a desired blend of workability. Moreover, the analysis of electron microscopy images allowed to reveal the influence of nanosilica spheres on the microstructure of tested samples.

1. *Singh L.P., Karade S.R., Bhattacharyya S.K., Yousuf M.M., Ahalawat S. Beneficial role of nanosilica in cement based materials – A review// Constr. Build. Mat.-2013.-47.-P. 1069-1077.*
2. *Kawashima S., Hou P., Corr D.J., Shah S.P. Modification of cement-based materials with nanoparticles// Cem. and Concr. Compos.-2013.-36.-P. 8-15.*