

Accepted Manuscript

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PII: S0958-9465(17)30939-3

DOI: [10.1016/j.cemconcomp.2018.05.018](https://doi.org/10.1016/j.cemconcomp.2018.05.018)

Reference: CECO 3071

To appear in: *Cement and Concrete Composites*

Received Date: 19 October 2017

Revised Date: 27 May 2018

Accepted Date: 31 May 2018

Please cite this article as: H. Li, R. Mu, L. Qing, H. Chen, Y. Ma, The influence of fiber orientation on bleeding of steel fiber reinforced cementitious composites, *Cement and Concrete Composites* (2018), doi: 10.1016/j.cemconcomp.2018.05.018.

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The influence of fiber orientation on bleeding of steel fiber reinforced cementitious composites

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Abstract: The bleeding of steel fiber reinforced cementitious composites influences the durability and mechanical properties of hardened composites, fiber orientation affects the bleeding of the composites. This paper focuses on the influence of fiber orientation on the bleeding of cementitious composites. A simplified mathematical model based on fluid mechanics is proposed to investigate the influence of fiber orientation on bleeding, and a series of experiments are carried out to assess the difference in bleeding between aligned and non-aligned (randomly oriented) fibers in steel fiber reinforced cementitious composites. The research results indicate that the bleeding characteristics of the composites are greatly affected by the inclination angle of fibers in the matrix. The bleeding content increases as the inclination angle of fibers increases, and the bleeding content of horizontally aligned steel fiber reinforced cementitious composites (ASFRCC) is much less compared to non-aligned (randomly oriented) steel fiber reinforced cementitious composites, vertically ASFRCC, and plain concrete.

Keywords: Bleeding, Composite, Fiber Reinforcement.

Highlight:

1. A simple model describing the migration of water in the vicinity of fibers is proposed;
2. The model can be used to predict the bleeding of SFRCC;
3. ASFRCC has the lowest bleeding content among ASFRCC, SFRCC and plain cement mortar.

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