

## Accepted Manuscript

Effects of fiber shape, aspect ratio, and volume fraction on flexural behavior of ultra-high-performance fiber-reinforced cement composites

Doo-Yeol Yoo, Soonho Kim, Gi-Joon Park, Jung-Jun Park, Sung-Wook Kim

PII: S0263-8223(17)30618-9  
DOI: <http://dx.doi.org/10.1016/j.compstruct.2017.04.069>  
Reference: COST 8500

To appear in: *Composite Structures*

Received Date: 22 February 2017

Revised Date: 18 April 2017

Accepted Date: 25 April 2017



Please cite this article as: Yoo, D-Y., Kim, S., Park, G-J., Park, J-J., Kim, S-W., Effects of fiber shape, aspect ratio, and volume fraction on flexural behavior of ultra-high-performance fiber-reinforced cement composites, *Composite Structures* (2017), doi: <http://dx.doi.org/10.1016/j.compstruct.2017.04.069>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Effects of fiber shape, aspect ratio, and volume fraction on flexural behavior of ultra-high-performance fiber-reinforced cement composites

Doo-Yeol Yoo<sup>a</sup>, Soonho Kim<sup>a</sup>, Gi-Joon Park<sup>b</sup>, Jung-Jun Park<sup>b</sup>, and Sung-Wook Kim<sup>b,\*</sup>

### ABSTRACT

*This study investigated the feasibility of reducing fiber content in ultra-high-performance fiber-reinforced cement composites (UHP-FRCC). For this, three different types of steel fibers were considered, and three different aspect ratios were applied for the case of straight fibers. To quantitatively evaluate the cost effectiveness of reducing the fiber content of UHP-FRCC, cost analysis was also performed. Test results indicated that at low fiber volume fractions ( $V_f \leq 1.0\%$ ), the twisted fibers provided the highest flexural strength, but they exhibited similar strength and poorer toughness than the straight fibers at a  $V_f$  equal to or higher than 1.5%. Smaller flexural strength and toughness were observed in the specimens with hooked fibers than those with straight ones at a  $V_f$  equal to or higher than 1.0%. In the case of straight fibers, the one with the highest aspect ratio was more effective in improving the flexural performance than those with lower aspect ratios. The medium-length straight fibers were most efficient at improving the flexural performance of UHP-FRCC at a  $V_f$  equal to or higher than 1.5%. The total production costs of commercially available UHP-FRCC are reduced by as much as 32–35% by replacing short straight fibers with medium-length or long straight fibers.*

**Keywords:** *Ultra-high-performance fiber-reinforced cement composites; fiber type; aspect ratio; fiber volume fraction; flexural performance; cost analysis*

---

<sup>a</sup>Department of Architectural Engineering, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul, 04763, Republic of Korea.

<sup>b</sup>Structural Engineering Research Institute, Korea Institute of Civil Engineering and Building Technology, 283 Daehwa-dong, Goyangdae-ro, Ilsanseo-gu, Goyang-si, Gyeonggi-do, 10223, Republic of Korea.

\* Corresponding author.

Tel.: +82 31 910 0128, fax: +82 31 910 0715

E-mail address: dyoo@hanyang.ac.kr (D.-Y. Yoo), tnsgh0905@hanyang.ac.kr (S. Kim),

joon7767@kict.re.kr (G.-J. Park), jjpark@kict.re.kr (J.-J. Park), and swkim@kict.re.kr (S.-W. Kim)

Download English Version:

<https://daneshyari.com/en/article/4912019>

Download Persian Version:

<https://daneshyari.com/article/4912019>

[Daneshyari.com](https://daneshyari.com)