

Accepted Manuscript

Predicting the flexural behavior of ultra-high-performance fiber-reinforced concrete

Doo-Yeol Yoo, Nemkumar Banthia, Young-Soo Yoon

PII: S0958-9465(16)30521-2

DOI: [10.1016/j.cemconcomp.2016.09.005](https://doi.org/10.1016/j.cemconcomp.2016.09.005)

Reference: CECO 2719

To appear in: *Cement and Concrete Composites*

Received Date: 6 September 2015

Revised Date: 23 June 2016

Accepted Date: 8 September 2016

Please cite this article as: D.-Y. Yoo, N. Banthia, Y.-S. Yoon, Predicting the flexural behavior of ultra-high-performance fiber-reinforced concrete, *Cement and Concrete Composites* (2016), doi: 10.1016/j.cemconcomp.2016.09.005.

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.



Predicting the flexural behavior of ultra-high-performance fiber-reinforced concrete

Doo-Yeol Yoo^a, Nemkumar Banthia^b, and Young-Soo Yoon^{c,*}

ABSTRACT

To predict the flexural behavior of ultra-high-performance fiber-reinforced concrete (UHPFRC) beams including straight steel fibers with various lengths, micromechanics-based sectional analysis was performed. A linear compressive modeling was adopted on the basis of experiments. The tensile behavior was modeled by considering both pre- and post-cracking tensile behaviors. Pre-cracking behavior was modeled by the rule of mixture. Post-cracking behavior was modeled by a bilinear matrix softening curve and fiber bridging curves, considering three different probability density functions (PDFs) for fiber orientation, i.e., the actual PDF from image analysis and PDFs assuming either random two-dimensional (2-D) or three-dimensional (3-D) fiber orientation. Analytical predictions using the fiber bridging curves with the actual PDF or the PDF assuming 2-D random fiber orientation showed fairly good agreement with the experimental results, whereas analysis using the PDF assuming 3-D random fiber orientation greatly underestimated the experimental results.

Keywords: Ultra-high-performance fiber-reinforced concrete; Fiber length; Flexure; Micromechanical modeling; Tension-softening curve; Sectional analysis

^aDepartment of Architectural Engineering, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul, 04763, South Korea.

^bDepartment of Civil Engineering, The University of British Columbia, 6250 Applied Science Lane, Vancouver, BC V6T 1Z4, Canada.

^cSchool of Civil, Environmental and Architectural Engineering, Korea University, 145 Anam-ro, Seongbuk-gu, Seoul 02841, South Korea.

* Corresponding author.

Tel.: +82 2 3290 3320, Fax: +82 2 928 7656

Email address: dyoo@hanyang.ac.kr (D.-Y. Yoo), banthia@civil.ubc.ca (N. Banthia), and ysyoon@korea.ac.kr (Y.-S. Yoon)

Download English Version:

<https://daneshyari.com/en/article/5436964>

Download Persian Version:

<https://daneshyari.com/article/5436964>

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