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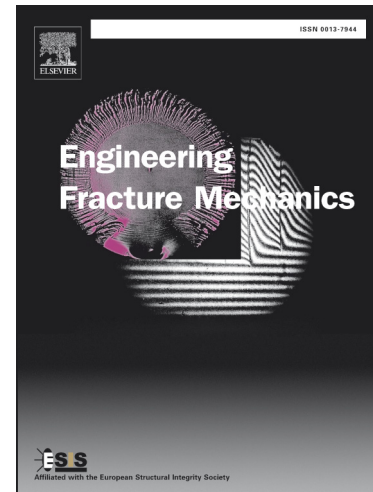
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Size effect in ultra-high-performance concrete beams

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

ABSTRACT

In order to investigate the size effect on the flexural performance of ultra-high-performance concrete (UHPC), numbers of UHPC beams with three different sizes, including two with smooth steel fibers with aspect ratios of 65 and 100 and one with twisted steel fibers with an aspect ratio of 100, were fabricated and tested. The beams made of UHPC matrix without fiber were also considered for evaluating the effect of fibers on the size effect. In addition, image analyses at crack surfaces were performed to investigate the size effect on the fiber distribution characteristics and their implication on the size-dependent flexural performance. Test results indicated that the flexural performance of UHPC noticeably decreased with an increase in the specimen size, caused by a decrease in the number of fibers and poor fiber orientation. The use of longer steel fibers with a higher aspect ratio was effective in reducing the sensitivity to the size effect of UHPC beams compared with shorter steel fibers. Finally, by applying similar fiber distribution characteristics for all test specimens of different sizes, an insignificant size effect on the flexural strength was obtained for UHPC with 2% by volume of steel fibers.

Keywords: Ultra-high-performance concrete; Steel fibers; Flexural performance; Size effect; Fiber orientation and dispersion

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1. Introduction

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