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Effects of loading rate and notch-to-depth ratio of notched beams on flexural performance of ultra-high-performance concrete

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1 **Effects of Loading Rate and Notch-to-Depth Ratio of Notched Beams on Flexural**
2 **Performance of Ultra-High-Performance Concrete**

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8 **Abstract**

9 This paper addresses the effects of loading rate and notch-to-depth ratio on flexural properties of
10 ultra-high-performance concrete (UHPC) notched beam specimens, in order to enable use of
11 standardized laboratory test data to predict flexural properties of UHPC structures that have
12 different dimensions and are subjected to a range of loading rates. UHPC notched beams were
13 tested in three-point bending to study the effects of three notch-to-depth ratios of 1/6, 1/3, and
14 1/2 at five loading rates of 0.05, 0.50, 1.25, 2.50, and 5.00 mm/min on flexural performance. Test
15 results indicate that loading rate and notch-to-depth ratio have significant effects on flexural
16 properties of the UHPC notched beams. The flexural strength is shown to increase with the
17 loading rate and the notch-to-depth ratio. The fracture energy increases with the loading rate but
18 decreases with the notch-to-depth ratio. The changes of flexural properties with the loading rate
19 are also dependent on the notch-to-depth ratio. Regression analyses to correlate flexural
20 properties associated with the loading rate and notch-to-depth ratio were conducted to obtain
21 parameters for UHPC structures.

22 **Keywords:** Flexural properties; Loading rate; Notch-to-depth ratio; Post-cracking behavior;
23 Ultra-high-performance concrete (UHPC)

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