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Analytical and experimental investigations on the fracture behavior of hybrid fiber reinforced concrete

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1 **Analytical and experimental investigations on the fracture behavior of hybrid**  
2 **fiber reinforced concrete**

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6 **ABSTRACT**

7 In the present study, Mode-I fracture tests of hybrid fiber reinforced concrete (HFRC) composite  
8 beams were conducted and the fracture properties and other post peak strength characteristics of  
9 the HFRC composites were evaluated and analyzed. The HFRC composite was produced using  
10 three types of fibers namely steel, Kevlar and polypropylene. A total of 27 HFRC composite  
11 beam specimens were cast and tested using the RILEM recommended three point bending test.  
12 The main variables were the fiber volume content and combinations of different fibers. The load  
13 versus crack mouth opening displacement (CMOD) curves of HFRC composite beams were  
14 obtained. Inverse analysis was carried out to determine the tensile strength and crack opening  
15 relationship. Analytical models based on comprehensive reinforcing index were developed for  
16 determining the influence of the fibers on fracture energy, flexural tensile strength, equivalent  
17 tensile strengths and residual tensile strengths of HFRC composites. Based on the experimental  
18 results and inverse analysis, a model for predicting the tensile softening diagram of HFRC  
19 composite mixes was also developed. The analytical models show conformity with the  
20 experimental results.

21 *Keywords:* Fibers; Concrete; Fracture; Tensile strength; Inverse analysis; Reinforcing index.

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