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Experimental and Numerical Investigations on Flexural Behavior of Macro-Synthetic FRC

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Abstract : Promotion of the Fiber Reinforced Concrete (FRC) as a construction material for civil engineering projects has invoked numerous researchers to investigate their mechanical behavior. Even though there is satisfactory information about the effects of fiber type and length, concrete mixture, casting type and other variables on the strength and deformability parameters of FRC, the numerical modeling of such materials still needs research attention. The focus of this study is to investigate the feasibility of Concrete Damaged Plasticity (CDP) model in prediction of Macro-synthetic FRC structures behavior. CDP model requires the tensile behavior of concrete to be well characterized. For this purpose, a series of uniaxial direct tension and four point bending tests were conducted on the notched specimens to define bilinear tension softening (post-peak tension stress-strain) behavior. With these parameters obtained, the flexural behavior of macro-synthetic FRC beams were modeled and the results showed a good agreement with the experimental measurements.

Keywords : concrete damaged plasticity, fiber reinforced concrete, finite element modeling, macro-synthetic fibers, uniaxial tensile test
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