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# A CRACKED HINGE BASED MODEL FOR HYBRID FIBER REINFORCED CONCRETE BEAMS

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**Abstract**: A numerical approach for modelling the mechanical behavior of fiber reinforced concrete beams is presented, based on a non-linear cracked hinge model, incorporating a fracture energy based constitutive law for the plain concrete matrix and in turn, proper constitutive laws aimed at capturing the crack-bridging effect of steel macro-fibers. Moreover, two different types of fibers are considered, including industrial and recycled fibers. The model particularly considers the fibers content, geometry, orientation and distribution, aiming at reproducing the complex influence of fibers on the overall response depending on the cracking onset and evolution. Mechanisms such as pull-out and dowel actions introduced by the fibers, are explicitly modelled. Numerical analyses demonstrate the accuracy of the proposed model, as their output are in very good agreement with a set of experimental results on fiber reinforced concrete beams recently tested at the University of Buenos Aires. The theoretical modelling activity presented in this paper is in the frame of the "SUPERCONCRETE" (H2020-MSCA-RISE-2014 n 645704) Project, funded by the European Union as part of the H2020 Framework Programme.