Deter mination of the concrete fracture Energy which is independent of the specimen size,using Inverse Analysis*

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ABSTRACT

Fracture energy of concrete G_f may be calculated, according to the International Reunion of Construction Materials and Experimental Tests (RILEM), from three points bending test performed on notched beam. Based on the force displacement curve, the calculated fracture energy is dependent on the specimen's size. Inverse Analysis is thus used in this work to solve this dependence problem by coinciding the experimental stress – crack mouth opening displacement CMOD curve with the analytical one using a power law strain-softening curve. Three points bending tests were performed on beams with different sizes and notch lengths to verify the effect of size and the notch length on G_f. Then, this fracture energy due to RILEM, $G_{f(exp)}$, were calculated and compared to the one resultant from inverse analysis G_f, and consequently beam's dimensions that lead to $G_{f(exp)}$ equal to G_f were specified. Furthermore, relations between material properties of concrete (tensile and compressive strength) and fracture parameters (fracture energy, critical crack opening W_c, the degree of exponential curve of stress – CMOD curve) based on the intrinsic fracture energy are established .

Keywords: concrete, fracture energy, inverse analysis, fictitious crack model, power-law strain-softening curve.

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