

Mechanical strength, flexural behavior and fracture energy of Recycled Concrete Aggregate self-compacting concrete

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The possibility of using Recycled Concrete Aggregates (RCA) to produce self-compacting concrete (RASCC) was investigated. Three parameters that are recycled coarse aggregate, recycled fine aggregate and Superplasticizer were studied with four different percentages of replacement. Compressive, flexural strength and modulus of elasticity tests were carried out in order to investigate the mechanical properties of the studied mixes. Based on the result of Taguchi analyses for the compressive strength, four mixes were selected to be in-depth studied in terms of flexural behavior. Eight 100×150×1200mm reinforced concrete beams were tested under two-point loading system. Flexural stiffness (k) and flexural toughness (I) were determined. The cracks pattern, propagation and their tortuosity were determined by utilizing of image processing technique using the fractal theory. Based on the experimental results, it was found that hardened properties and the flexural stiffness and toughness generally decreased with RCA incorporation. However, SCC has 39 MPa compressive strength still achievable even with 100% RCA replacement. Surface cracks fracture energy parameters were also determined. It was found that the classical definition of fracture energy was in agreement with the deterioration in strength, stiffness, toughness, for the tested beams with incorporating RCA.