The Tensile Behavior of Ultra-High Performance Concrete Under Monotonic and Cyclic Test to Evaluate Fracture Energy

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Abstract:

Fracture energy of ultra-high performance concrete (UHPC) with steel fibers was investigated in this study. The monotonic and cyclic tensile tests were performed on UHPC specimens with 1% volume fractions of fibers. The curves of monotonic stress-strain and cyclic loading envelope were compared in similar trend. The plastic behavior of material will be changed due to the increase of cyclic loading, such as residual strain, plastic strain, unloading strain and coefficient of elasticity. The peak stress of actual plastic strain can be calculated by the relationship between the plastic and the unloading strain. Then, the areas of the strain hardening and softening under the stress-strain curve were obtained for the fracture energy and damage index. The theoretical values can be calculated to be closer to the actual conditions by this method.

Keywords:

Fracture energy, ultra-high performance concrete, steel fiber, cyclic tensile test.