

Modeling of Crack Propagation Path in Concrete with Coarse Trapezoidal Aggregates by Boundary Element Method

Authors : Chong Wang, Alexandre Urbano Hoffmann

Abstract : Interaction between a crack and a trapezoidal aggregate in a single edge notched concrete beam is simulated using boundary element method with an automatic crack extension program. The stress intensity factors of the growing crack are obtained from the J-integral. Three crack extension paths: deflecting around the particulate, growing along the interface and penetrating into the particulate are achieved in terms of the mismatch state of mechanical characteristics of matrix and the particulate. The toughening is also given by the ratio of stress intensity factors. The results reveal that as stress shielding occurs, toughening is obtained when the crack is approaching to a stiff and strong aggregate weakly bonded to a relatively soft matrix. The present work intends to help for the design of aggregate reinforced concretes.

Keywords : aggregate concrete, boundary element method, two-phase composite, crack extension path, crack/particulate interaction

Conference Title : ICMME 2015 : International Conference on Mechanical, Materials and Mechatronics Engineering

Conference Location : Rome, Italy

Conference Dates : December 03-04, 2015