World Academy of Science, Engineering and Technology
International Journal of Geotechnical and Geological Engineering
Vol:10, No:05, 2016

Concrete Cracking Simulation Using Vector Form Intrinsic Finite Element Method

Authors : R. Z. Wang, B. C. Lin, C. H. Huang

Abstract : This study proposes a new method to simulate the crack propagation under mode-I loading using Vector Form Intrinsic Finite Element (VFIFE) method. A new idea which is expected to combine both VFIFE and J-integral is proposed to calculate the stress density factor as the crack critical in elastic crack. The procedure of implement the cohesive crack propagation in VFIFE based on the fictitious crack model is also proposed. In VFIFIE, the structure deformation is described by numbers of particles instead of elements. The strain energy density and the derivatives of the displacement vector of every particle is introduced to calculate the J-integral as the integral path is discrete by particles. The particle on the crack tip separated into two particles once the stress on the crack tip satisfied with the crack critical and then the crack tip propagates to the next particle. The internal force and the cohesive force is applied to the particles.

Keywords : VFIFE, crack propagation, fictitious crack model, crack critical
Conference Title : ICUEES 2016 : International Conference on Urban Earthquake Engineering and Seismology
Conference Location : Tokyo, Japan
Conference Dates : May 26-27, 2016