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基于虚拟裂缝模型的混凝土断裂过程区研究

卿龙邦[1], 李庆斌[1], 管俊峰[1,2], 王娟[1]

1. 清华大学水沙科学与水利水电工程国家重点实验室,北京 100084;
2. 华北水利水电学院土木与交通学院,河南,郑州 450011

STUDY OF CONCRETE FRACTURE PROCESS ZONE BASED ON FICTITIOUS CRACK MODEL

QING Long-bang[1], LI Qing-bin[1], GUAN Jun-feng[1,2], WANG Juan[1]

1. State Key Laboratory of Hydroscience and Engineering, Tsinghua University, Beijing 100084, China;
2. School of Civil Engineering and Communication, North China Institute of Water Conservancy and Hydroelectric Power, Zhengzhou, Henan 450011, China

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摘要

利用虚拟裂缝模型对混凝土断裂过程区进行了研究.以无限大板中心拉伸裂缝模型为例,将过程区裂缝张开位移采用多项式级数形式表示,求得了断裂过程区上的位移分布和粘聚力分布.进而分析了材料参数对断裂过程区上的位移、粘聚力、断裂过程区长度以及峰值外荷载的影响.结果表明:断裂过程区上的位移和粘聚力均为非线性分布.断裂过程区长度随骨料最大粒径增大而逐渐增大,随抗压强度增大而逐渐减小.峰值外荷载随骨料最大粒径和抗压强度增大均逐渐增大.

关键词: 混凝土 虚拟裂缝模型 断裂过程区 拉伸软化曲线 裂缝张开位移

Abstract:

Based on the fictitious crack model, fracture process of concrete is studied in this paper. Taking the tensile fracture model for the center of an infinite plate for an example, and by expressing the opening displacement in fracture process zone in a polynomial, the distributions of displacement and cohesive stress in the fracture process zone are obtained. Furthermore, effects of the material parameters on different physical variables are analyzed, including the distribution of displacement and cohesive stress, length of fracture process zone and peak load. The results show that the stress and the displacement of the fracture process zone are both in nonlinear distributions. The length of fracture process zone gradually increases with the maximum aggregate size and decreases with the compressive strength. The peak load increases with both the maximum aggregate size and the compressive strength.

Key words: concrete fictitious crack model fracture process zone softening curve crack opening displacement

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通讯作者: 李庆斌(1964－),男,河南周口人,教授,博士,博导,从事混凝土材料与结构基本理论的研究(E-mail: qingbinli@tsinghua.edu.cn). E-mail: qingbinli@tsinghua.edu.cn

作者简介: 卿龙邦(1982－),男,湖北天门人,博士生,从事混凝土断裂及损伤方面的研究(E-mail: qlongbang@126.com);管俊峰(1980－),男,河南许昌人,讲师,博士,从事混凝土断裂及损伤方面的研究(E-mail: shuaipipi88@126.com);王 娟(1981－),女,河南信阳人,讲师,博士,从事混凝土材料基本理论的研究(E-mail: wangjuan@zzu.edu.cn).

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地址：北京清华大学新水利馆114室　邮政编码：100084
电话：(010)62788648　传真：(010)62788648　电子信箱：gclxbjb@tsinghua.edu.cn