عنوان مقاله:

Size Effect, Fracture Toughness, and Process Zone in Numerical Simulation of Rock Fracture

محل انتشار:

نهمین کنگره بین المللی مهندسی عمران (سال: 1391)

تعداد صفحات اصل مقاله: 8

نویسندگان:

Ali Tarokh - *Graduate student, Department of Mineral Engineering, New Mexico Tech, Socorro*

Ali Fakhimi - *Professor and corresponding author, Department of Mineral Engineering, New Mexico*

خلاصه مقاله:

A bonded particle model is used in three point bending simulation of rock fracture to investigate whether size of fracture process zone is an intrinsic material property. Different sample sizes are used. The normal bond between particles at contact points is assumed to follow a softening behavior. The slope of the linear softening is considered a material property. An extensive numerical analysis is conducted to obtain the nominal tensile strength, apparent fracture toughness, and width of the process zone. It is shown that the apparent fracture toughness is a function of the specimen size and that the change in nominal tensile strength with specimen size can be captured by Bazant's size effect law. In addition, the numerical results suggest that inverse of width of crack tip process zone has a linear relationship with inverse of specimen size. The numerical results show a stronger relationship between width of process zone and specimen size for a material with a small brittleness number. On the other hand, for a more brittle material, specimen size has a small or no impact on size of process zone; process zone can be considered a material property when the brittleness number is greater than 10.

کلمات کلیدی:

Process zone, fracture toughness, size effect, numerical modeling

لینک ثابت مقاله در پایگاه سیویلیکا:

https://civilica.com/doc/166487