

MECHANISM OF DEFORMATION AND FAILURE OF INFILLING ROCK JOINT AND ITS PARTICLE FLOW SIMULATION

Lei Xu ¹; Qingwen Ren ²

¹ College of Water Conservancy and Hydropower Engineering, Hohai University, Nanjing 210098, China, leixu@hhu.edu.cn

² College of Mechanics and Material, Hohai University, Nanjing 210098, China, renqw@hhu.edu.cn

Key Words: *Infilling Rock Joint, Deformation and Failure Mechanism, Particle Flow Simulation.*

The material composition and structural features of an infilling rock joint is very complicated, and the existing mechanical models of filling rock joint can't reflect the micro-mechanism and the gradual weakening mechanism with the existence of filling material.

In order to solve the above-mentioned fundamental scientific problem, the complex interaction between infill material and rock wall was studied through the combination of numerical modelling with particle flow code and theoretical analysis, and the micro-mechanism of deformation and failure of rock joints was further studied. The gradual weakening mechanism of the mechanical characteristics of rock joints with the increase of filling thickness was revealed, and the gradual weakening mechanical model was established based on the realization of the mathematical description of the relationship between deformation and failure characteristics and filling thickness.

The macro incremental constitutive model of an infilling rock joint was then established based on the nonlinear constitutive model theory. The constitutive model can intrinsically embody the interaction mechanism between infill material and rock wall, and also can be applied to the rock joints with different filling thickness.