

NUMERICAL SIMULATION OF DYNAMIC FRACTURE OF SANDSTONE BASED ON HJC MODEL

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ABSTRACT

The dynamic Mode-I fracture test of sandstone based on the HJC constitutive model is numerically simulated using the finite element program LS-DYNA in order to investigate the dynamic fracture characteristics of sandstone samples under various impact velocities. The whole failure processes of crack initiation, evolution, propagation and penetration of sandstone samples under the impact velocity of 3.5 m/s, 4 m/s, 4.5 m/s, and 5 m/s are obtained, and the influence of impact velocity on crack propagation velocity is analyzed. In addition, according to the numerical simulation results, the dynamic fracture toughness under different impact velocities is calculated, and the relationship between the impact velocity and dynamic fracture toughness is analyzed. Results show that both the crack propagation velocity and dynamic fracture toughness of NSCB sandstone specimen increases with the increase of impact velocity. The simulation results are of great significance to the safe and stable construction of rock mass engineering and the prevention and control of rock mass disasters.

KEYWORDS: Numerical simulation, Sandstone, Dynamic compressive strength, Dynamic fracture toughness

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