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粒子法による複雑な自由表面を有する岩石の破壊進展解析
Numerical study for failure behavior of rock masses including complex free-surfaces using a particle method

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Failure of rock mass including complex free surfaces is of importance in many engineering and scientific fields. This paper applied an advanced discretization approach to simulate quasi-static failure of rock mass within a Hamiltonian particle method (HPM) framework. In HPM, a free surface is introduced in a simple way, just by removing or ignoring outer particles. This potential can be developed to discretize numerical models including complex free surfaces without the increment of time for pre-processing. In the present study, we developed the numerical simulator based on HPM with a staggered particle technique for simulating brittle failure and AE activities in rock mass with incorporating the elasto-plastic damage model. We, first, conducted uni-axial compressive tests for validating the effectiveness of our approach. Next, we adopted rectangular and circular disc specimens with a hole as complex free surface models. Our numerical results had good agreement with those from laboratory experiments. This suggests that HPM would be a method to simulate failure behavior of rock mass without time-consuming pre-processing.

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