A FINITE FRACTURE MECHANICS APPROACH TO HYDRAULIC FRACTURING

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This work presents a novel approach based on Finite Fracture Mechanics (FFM) to investigate hydraulic fracturing of rocks. The criterion is based on a critical distance, and on the simultaneous fulfilment of a stress requirement and the energy balance: two material constants are involved, namely the tensile strength and the fracture toughness [1]. The FFM unknowns are represented by the critical crack advance and the fracture initiation pressure. The study mainly focuses on impermeable rocks, by considering the case of a pressurized hole coupled with far-field compression. The stability growth of hydraulic fractures is discussed, and the model is validated against experimental data available in the literature [2]. The case of permeable rock is also preliminary discussed by supposing that the growing cracks are loaded by the same internal pressure acting on the circular border.

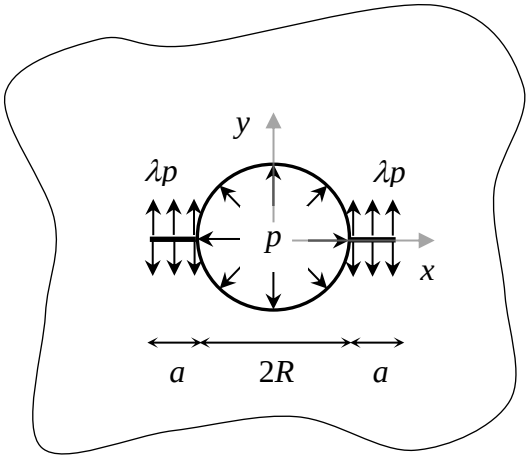

Fig. 1. Circular hole under internal pressure.

References

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