

Crack tracking algorithms for 3D fracture propagation based on a viscous regularization

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ABSTRACT

The three-dimensional quasi-static fracture propagation problem is framed into the theory of standard dissipative processes [1], inheriting the relevant theoretical findings as well as the computational strategies.

Moving from the usual interpretation of viscosity as a regularization of the rate-independent formulation [2], a viscous regularization of the fracture propagation in brittle materials is devised.

An explicit in time crack tracking algorithm derives, thanks to the availability of a simple and effective approximation of the crack front velocity.

Major drawbacks of preceding variational formulations [3], due to the need of computing accurate approximation for weight functions, have been overcome and an efficient numerical implementation is obtained.

Several performed benchmarks allow to establish algorithm performances, showing a promising potential in predicting fractures path due to the increment of the external loadings and of an internal pressure, as in the case of hydraulic fractures.

REFERENCES

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