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New algorithms for numerical simulation of multiple hydraulic fractures in low permeability rocks

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Modelling of multiple fractures in hydraulic fracturing is of importance for creating a complex fracture network and enhancing the productivity of resources in underground reservoirs. In this work, multiple hydraulic fracturing in low permeability media is studied by extended finite element method (XFEM) and the governing equations for fluid flow and elastic rock are introduced. Two robust algorithms are presented to couple the two media (rock and fracturing fluid) for discretized model in plane strain condition. The algorithms include: 1) stress transfer from fluid to rock matrix and 2) evolution of fracture opening width, resulting in the change of fluid pressure. An iterative process is demonstrated for the interaction of the two media to promote convergence. The coupled model for multiple hydraulic fracturing is developed to express the interaction between the model parameters, combined with the process of fracture propagation. To verify the results, the shadow effect between fractures is analysed by showing the stress change alongside the propagating fractures.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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