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Simulating HF using FDEM: Effects of pre-existing joints, induced microseismicity and fluid diffusion

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Abstract

In this numerical study, the FDEM (Fast Elastoplastic Distension Method) was used to simulate hydraulic fracturing in a rock medium for different applications. The main objective of this study is to investigate the induced microseismicity and fluid diffusion due to changes in fluid viscosity, which can be achieved by changing the temperature. The rock medium was modeled using 2D triangular elements, and the fluid pressure was considered as a secondary variable. The rock medium was assumed to be isotropic, and the fluid was assumed to be inviscid. The results show that the induced microseismicity is significantly affected by the fluid viscosity, and the fluid diffusion is significantly affected by the fluid viscosity and the fluid pressure. The results also show that the induced microseismicity and fluid diffusion can be effectively simulated using the FDEM.