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Characterization of dynamic fracture network extension in porous media by means of fractal geometry

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Fracture network can be commonly found or produced in many natural or damageable porous media, such as reservoirs, brittle materials and soil. Thus, fracture network and fractured porous media as well as their transport properties have received great attentions in many fields. Fractures are usually extended in length and aperture to form complex fracture network under some external conditions. The complexity of fracture network can be well quantitatively characterized by fractal geometry through fractal dimension and other parameters.

Based on the improved box-counting technique, we measured the dynamic characterization of fracture network extension in porous media under drying process, and further respectively related fractal dimensions of fracture network to drying time, average aperture, moisture content and fracture porosity. It is found that the fractal dimension increases exponentially with drying time and average aperture, and decreases with moisture content in the form of power law. The transport capacity of fracture network is also related to the fractal dimension with drying time in the form of exponential function.

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