

Acoustic emission imaging of induced asymmetrical hydraulic fractures

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ABSTRACT: Hydraulic fracturing (HF) is commonly used to stimulate hydrocarbon reservoirs. The artificially generated fractures are generally assumed to develop with two symmetrical wings. However, in natural settings many cases are observed where fracture wings are not symmetrical. Two laboratory HF experiments were conducted to investigate the role of stress in creating asymmetrical fractures. By applying uneven stress fields in two opposite sides of the tested samples, asymmetrical fracture wings were induced. Acoustic emission (AE) technology was used to monitor the development of such fractures. By locating the AE events, the initiation and propagation of the fractures were imaged. All fractures were found to initiate from the center of the hydraulically pressured section in the borehole and propagate to the edge of the side with the higher stress. On the low stress side, only tiny fractures were observed.