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Strength and stability of fractured rocks

Wednesday, 2 June 2021 15:45 (15 minutes)

Strength and stability of rocks are essential information [1] for engineers and operators working in the field like petroleum production, geothermal installation and underground CO2 storage. During operations, sometimes fractures open-up at the well-boundaries and fractures are mostly seen as "disturbing elements"for the stability of wells and well-operations. It is a real challenge to plan a drilling operation in fractured-reservoirs (like chalk reservoirs) due to the presence of natural fracture network -drilling must be done in a controlled manner so that the well-integrity is not disturbed. Therefore, we need a better understanding on how pre-existing fractures can reduce the strength/stability of rocks. In addition, we need to develop tools for monitoring the opening-up of new fractures and their development. Our lab experiments [2,3] explored the stress-induced fracturing behavior of reservoir rocks during fluid injection scenarios. Using the acoustic emission (AE) monitoring system, we could count new fractures (micro-cracks) and track the major fracture propagation. In addition, we have developed a discrete element model (DEM) simulation code based on Fiber bundle model [4,5] to analyze the role of fractures (damage) on the strength/stability of porous rocks. Our simulation code can take into account both long-range and short-range load-sharing scenarios [6,7].

Time Block Preference

Time Block B (14:00-17:00 CET)

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