

# **Formation and Casing Shear During Injection / Production Activities**

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## **Abstract**

Interface shear during oilfield development is related to casing damage. Reservoir formation stability is closely related to reservoir geology and reservoir geomechanics. Reservoir heterogeneities in strength and stiffness may result in a shear band in the formation, usually along a lithological interface, in part because of weakness of the interface, in part because of the stiffness contrast that causes a shear stress concentration. If the lithological interface is continuously distributed in a reservoir, formation stability in the region may be compromised during high pressure injection processes that are commonly used as part of reservoir development. Water-sensitive shales often form the cap rocks to reservoir zones, and as water under high pressure is displaced into the formation, a degradation of shale properties takes place, resulting in a weakening of the shale-sand interface.

This paper introduces a geomechanics analysis using rheological model and linear elastic model for an onshore reservoir with soft mudstone caprock. The reservoir geomechanics simulation results, combined with field data, provided an estimate of the critical state of formation stability in terms of injection pressures, block pressure differences, and the water-affected shale area ratio.