Determining In-Situ Stress in the Southeast Zagros Fold and Thrust Belt by Using Image Logs and Conventional Logs

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The Zagros folded and thrust belt is among the earth's most active continental collision zones. The collision occurred in the late Oligocene–early Miocene, followed by continental shortening. The study area is a prolific region in southeastern Iran with many oil and gas wells, where the knowledge of the present-day stress is essential for any oil and gas production. Therefore determining the in-situ stresses provides critical insights into this region's tectonics and ensures safe and efficient oil well drilling and production. This study presents a geomechanical analysis of the Asmari reservoir from the two oil fields in southwestern Iran situated in the prolific Dezful embayment. A cumulative of 2.5 km of acoustic and resistivity borehole image logs in nine boreholes at two oil fields on the border of the collision between the Arabian and Eurasian plates has been analyzed. This study utilized a combined breakout and drilling-induced tensile fracture to estimate the orientation of in situ horizontal stresses. The results provide nine quality-ranked orientations of maximum horizontal stress data. The average azimuth of the combination of breakouts and drilling-induced tensile fracture for field (A) was N75W, and for field (B) was N35W. Also, this study presents a scientific approach to estimating the magnitude of maximum and minimum horizontal stresses based on the Poroelastic strain theory for the Asmari Formation in the southeastern part of the Zagros folded and thrust belt at different depths in two fields. However, results showed slightly different orientations for different wells for fields (A) and (B), but the overall orientation of maximum horizontal stress is approximately aligned with NE-SW, which is relatively consistent with the tectonic plate movement and other resources in previous studies. A thrust tectonic stress regime in the studied fields was inferred based on the relative stress magnitudes.

Keywords: In situ stress, Borehole Image Logs, Zagros Folded-and-Thrust Belt , Breakout

