STRAIN AND STRESS ANALISYS OF A FRACTURED CARBONATE RESERVOIR, CAMPOS BASIN, BRAZIL

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The strain accumulated in reservoir rock volumes and the in situ stress can strongly constraint hydrocarbon production. The knowledge of this control is essential to define exploration development and management strategies for deformed reservoirs, particularly for fractured reservoirs. In this work we have studied a fractured Albian carbonate reservoir from Campos Basin in the Brazilian atlantic margin. The studied reservoir is included in a salt-detached carbonate fault block deformed by divergent gliding of underlying Aptian salt. Fracture description from cores shows open fractures positioned below a shaly marker bed and above an interval with shear and stylolite closed fractures. Curvature analisys of reservoir top indicates that fracture-related production from the reservoir was concentrated in a high curvature zone. Therefore a bending model is suggested for reservoir fracturing. Breakout analisys showed a dispersal horizontal stress pattern as we expect for a generalized extension model, and a strong control of the maximum horizontal stress next and subparallel to a main N-NE fault, as we can predict with finite element models. It was also observed a bimodal character of maximun stress distribution, with a 90o rotation from WNW in pre-Aptian rift sucessions to NNW-NE in the Albian carbonates, confirming detachement and stress uncoupling. Oil migration timing indicates a very recent deformation phase, therefore coherent with the observed stress field, for usefull open fractures, which were probably caused by rollover bending related to listric fault reactivation. Bending axes are key features for fracture distribution and permeability anisotropy in the reservoir.