

Relationship between Wave Velocities and Geo-Pressures in Shallow Libyan Carbonate Reservoir

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Abstract : Knowledge of the magnitude of Geo-pressures (Pore, Fracture & Over-burden pressures) is vital especially during drilling, completions, stimulations, Enhance Oil Recovery. Many times problems, like lost circulation could have been avoided if techniques for calculating Geo-pressures had been employed in the well planning, mud weight plan, and casing design. In this paper, we focused on the relationships between Geo-pressures and wave velocities (P-Wave (V_p) and S-wave (V_s)) in shallow Libyan carbonate reservoir in the western part of the Sirte Basin (Dahra F-Area). The data used in this report was collected from four new wells recently drilled. Those wells were scattered throughout the interested reservoir as shown in figure-1. The data used in this work are bulk density, Formation Multi-Tester (FMT) results and Acoustic wave velocities. Furthermore, Eaton Method is the most common equation used in the world, therefore this equation has been used to calculate Fracture pressure for all wells using dynamic Poisson ratio calculated by using acoustic wave velocities, FMT results for pore pressure, Overburden pressure estimated by using bulk density. Upon data analysis, it has been found that there is a linear relationship between Geo-pressures (Pore, Fracture & Over-Burden pressures) and wave velocities ratio (V_p/V_s). However, the relationship was not clear in the high-pressure area, as shown in figure-10. Therefore, it is recommended to use the output relationship utilizing the new seismic data for shallow carbonate reservoir to predict the Geo-pressures for future oil operations. More data can be collected from the high-pressure zone to investigate more about this area.

Keywords : bulk density, formation multi-tester (FMT) results, acoustic wave, carbonate shallow reservoir, d/jfield velocities

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