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FORMATION EVALUATION ON WELL LOG DATA FOCUSING ON THE ESTIMATION OF THE ELASTIC PROPERTIES ROCK STRENGTH AND THE STRESS FIELD INCLUDING THE EVALUATION WITH LABORATORY DATA

Master's degree Reservoir Geology and Geophysics

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Abstract

Elastic modulus, rock strength and stress state are fundamental parameters for the oil industry. However, obtaining these parameters usually requires cores samples which are expensive and difficult to extract. Searching an alternative to solve this problem, the well logs arise, they provide continuous record of formation properties in depth with the advantages that are inexpensive and easier to obtain, moreover the logs provide in-situ measurements. Thus, recently the industry has given to the task of develop methods, equations that correlates the geomechanical parameters with the log properties. Therefore, in this work an extensively literature review of several approaches to estimate the elastic modulus, rock strength and stress state from logs have been carried out. These approaches are first applied, compared and evaluated in a well in the Vienna Basin, and second, they are calibrated with the core measurements available with the purpose of select the best and more accurate methods in order to apply them in the future on other wells of the basin. The relationship with the density, shale content and porosity was also studied.

The estimation of geomechanical parameters and stress state from logs was achieved obtaining reasonable results. The next step was to identify variables such as the correlation type, dependent parameter, lithology and location from the best approaches in order to determine what variables are important to obtain accurate results.