Oilfield Technologies for Characterization of Fractured Clastics

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Cost-effective production of oil and gas from fractured clastic reservoirs requires comprehensive characterization of the structural and petrophysical properties of these reservoirs and, in particular, of the static and dynamic attributes of the fracture networks.

Structural imaging with surface and borehole seismic technologies help detect swarms of fractures and delineate faults at the scale of the reservoir. In the vicinity of the well and at a scale of the meter down to the centimeter, sonic logging as well as resistivity and acoustic borehole imaging complement the large scale seismic imaging. Data processing and interpretation methods have been developed to help discriminate open from closed fractures and estimate their alignment with respect to the local stress field. Dynamic attributes of the fracture networks and petrophysical properties of the matrix can be estimated through a host of technologies; in particular through transient (well) testing at the reservoir scale and through pressure measurements and fluid sampling, as well as NMR measurements in the vicinity of the well. These technologies have seen remarkable advances over the past few years whether in the hardware, in terms of enhanced signal acquisition, resolution, and repeatability, and processing and interpretation methodologies that take into account more realistic measurement environments such as mechanical damage or fluid invasion in the near wellbore. Using examples from case studies performed in fractured reservoirs of Algeria and reported in the latest Sonatrach-Schlumberger Well Evaluation Conference Algeria 2007 book, this paper will highlight the advances and benefits obtained in the applications of these technologies. The paper will also highlight the necessity to consider the acquired data and processed and interpreted results within an integrated reservoir modeling framework that facilitates design of optimal strategies for reservoir development and production.