

## **Detecting Natural Fractures and Modeling Them to Optimize Field Development Plan in Libyan Deep Sandstone Reservoir (Case Study)**

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**Abstract :** Fractures are a fundamental property of most reservoirs. Despite their abundance, they remain difficult to detect and quantify. The most effective characterization of fractured reservoirs is accomplished by integrating geological, geophysical, and engineering data. Detection of fractures and defines their relative contribution is crucial in the early stages of exploration and later in the production of any field. Because fractures could completely change our thoughts, efforts, and planning to produce a specific field properly. From the structural point of view, all reservoirs are fractured to some point of extent. North Gialo field is thought to be a naturally fractured reservoir to some extent. Historically, natural fractured reservoirs are more complicated in terms of their exploration and production efforts, and most geologists tend to deny the presence of fractures as an effective variable. Our aim in this paper is to determine the degree of fracturing, and consequently, our evaluation and planning can be done properly and efficiently from day one. The challenging part in this field is that there is no enough data and straightforward well testing that can let us completely comfortable with the idea of fracturing; however, we cannot ignore the fractures completely. Logging images, available well testing, and limited core studies are our tools in this stage to evaluate, model, and predict possible fracture effects in this reservoir. The aims of this study are both fundamental and practical—to improve the prediction and diagnosis of natural-fracture attributes in N. Gialo hydrocarbon reservoirs and accurately simulate their influence on production. Moreover, the production of this field comes from 2-phase plan; a self depletion of oil and then gas injection period for pressure maintenance and increasing ultimate recovery factor. Therefore, well understanding of fracturing network is essential before proceeding with the targeted plan. New analytical methods will lead to more realistic characterization of fractured and faulted reservoir rocks. These methods will produce data that can enhance well test and seismic interpretations, and that can readily be used in reservoir simulators.

**Keywords :** natural fracture, sandstone reservoir, geological, geophysical, and engineering data

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