Using Dynamic Data to Validate Conductive Fracture Orientations in an Oil and Gas Field from Southeastern Mexico

**Norma A. Olaez-Ahedo, Carlos F. Tapia-García,
Clotilde Prieto-Ubaldo, and Lilia Hernández-Salazar**

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ABSTRACT

In the development and exploitation of naturally fractured reservoirs, there is economic implication in knowing the direction and quality of conductive fractures that allow fluid flow. In this study, the directions of conductive fracture systems were determined in an Lower-Upper Cretaceous reservoir in the Costero Field, southeastern Mexico, based on oriented thin sections, analyses from cores, and image log interpretation. Stereographic projections were used to plot fracture orientations. Four main fracture systems were detected: two conductive systems (E-W and NE-SW) and two non-conductive systems (N-S and NW-SE). Conductive systems showed that fracture-matrix, fracture-vug, and fracture-matrix-vug connectivity improve the fluid communication in the reservoir. These results were validated with dynamic data using interference tests between four wells in the field. Tests showed pulses as tendency changes in all the active wells due to the shut-in of one well. The analytic models indicate the greater permeability (pressure communication and flow) between wells was in an E-W direction, and the minor permeability in a N-S direction. Both directions are consistent with the fracture system orientations determined in the static study. We conclude that the validation of fracture characterization with dynamic well data fortifies the reservoir knowledge, providing better fracture models to help reduce uncertainty during field development in naturally fractured reservoirs.

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