Modeled Stress Perturbation at Cooper Basin Fault Tips

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Abstract

Tight reservoirs such as shale gas, shale oil, coal seam gas (CSG) and tight sands require fracture stimulation to produce at economic rates. Experience shows that the production rates from fracture stimulated wells can be highly variable even between closely spaced wells in the same field. Possible explanations for production variation include local changes in stress and change in natural fracture orientation and density documents stress magnitudes at different depths in the Cooper Basin, Australia.

This study utilizes stress data to create number of stress simulation models using Poly 3D. The stresses are usually considered on a regional scale and the influence of local factors is usually overlooked. This study determines the impact of variations in maximum horizontal stress (σ_{Hmax}) magnitude and explains the possible fracture propagation near faults. Strike-slip stress regime prevails at the selected depth interval. A thorough study using different lithologies, σ_H azimuth and fault size is carried out. Stress concentration at the fault tips increases with fault size. However, the intensity of fluctuation appears to diminish after fault length of 1500 meters. These models help in understanding the orientation of fractures during hydraulic fracturing and help to recognize stress barriers that may limit the drainage area from an unconventional reservoir.