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POLY3D

Rock mechanics for structural geology

APPLICATIONS

- Structural interpretation
- Fractured reservoir modeling
- Drilling planning
- Reservoir geomechanics
- Earthquake study

BENEFITS

- Identify which prospects hold the best chances of success
- Reduce uncertainty in seismic interpretation of complex fault networks
- Improve decision making and reduce drilling risks
- Increase productivity by building more accurate, underconstrained complex geological models

FEATURES

- Model natural fractures and seal integrity in unconventional reservoirs
- QC seismic and structure interpretation
- Model joint and fault reactivation
- Model natural fracture type, density, and orientation to constrain discrete fracture network simulation
- Strategic well positioning with respect to natural fractures
- Model heterogeneous in situ stress in reservoirs
- Well path design in present-day stress fields

Poly3D* software provides fast, user-friendly 3D forward stress modeling tools based on the boundary element method (BEM). This innovative technology provides characterization and modeling of subseismic fractures, and facilitates better drilling decisions using the fundamental principles of physics that govern rock deformation.

3D fault model QC

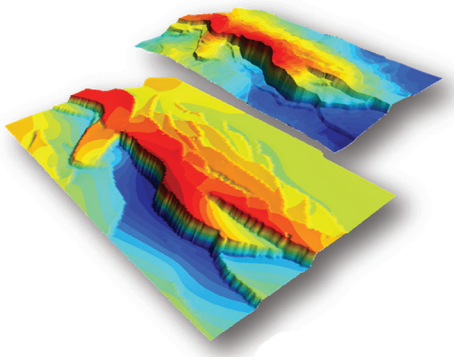
The identification and recovery of hydrocarbons requires an accurate geologic model of the reservoir structure. The 3D forward capabilities in Poly3D software reduce uncertainty in seismic interpretation of complex fault networks and allow more accurate underconstrained complex geological models to be built.

Natural fracture modeling

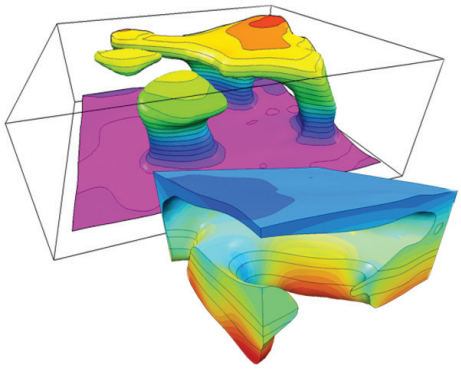
Modeling natural fractures in unconventional reservoirs is a challenging task, requiring the physics of fracture development through time to be taken into account. Poly3D software computes heterogeneous stress fields through time to reveal their impact on seal integrity and product, as well as to model subseismic fractures and faults.

Well design

Drilling in structurally complex reservoirs is highly challenging, especially when the area is tectonically active. Poly3D software creates 3D models of present-day heterogeneous stress fields caused by active faulting and salt diapir, significantly improving decision making and reducing drilling risks.



Comparison of seismic horizon (back) and Poly3D results (front) for 3D fault model QC (data courtesy of Total SA).



Complex salt diapir used to compute present-day stress field.

Accurate structural model

Poly3D software is able to use structural models containing hundreds of faults independently from the complexity of the fault network (multiple X, Y, and thrust faults are handled).
Any 3D complex discontinuities (e.g., joints, sedimentary layers, cavities, and salt bodies) can also be modeled using triangular dislocation technology.

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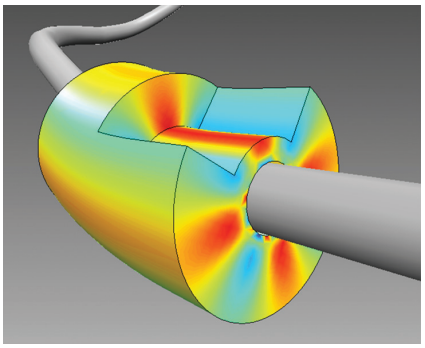
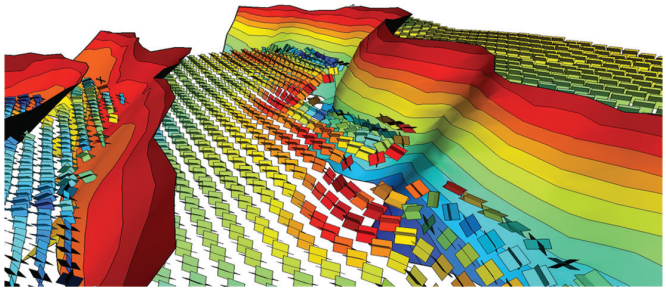


Modeled stress field around pressurized wellbore.

Efficient 3D forward stress modeling

Poly3D honors the fundamental laws of physics that govern rock deformation, not geometrical assumptions and kinematics postulates. This allows it to

- model 3D loading conditions representing any tectonic regime (e.g., normal, thrust, or strike-slip fault), gravity field, and effective stress
- compute fault mechanical interaction in response to the applied tectonic loading, as opposed to standard elastic dislocation methods
- compute displacement, strain and stress fields, and associated attributes anywhere in the surrounding volume (i.e., on the Earth's surface, on seismic horizons, along well paths, at reservoir grid nodes, at cross sections, or at volumes)
- run several simulations at the reservoir scale in few minutes, allowing for sensitivity analysis of the results.



Modeled density and orientation of subseismic faults in reservoir from Poly3D forward stress modeling.

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