

GOHFER Introduction and Integrated Workflow Overview

Topic Outline for a 1 hour 30 minute training video

Video summary: This introductory presentation explains what GOHFER is, the physical and numerical foundations that distinguish it from conventional fracture simulators, and the end-to-end workflow that connects well construction, petrophysics, diagnostics, geomechanics, fracture simulation, production analysis, and economic optimization.

Learning objectives

- Understand GOHFER as a deterministic, fully three-dimensional hydraulic-fracture and geomechanics simulator rather than only a fracture-geometry model.
- Recognize the model foundations for fluid/proppant transport, rock deformation, fracture extension, stress interaction, and multiwell simulation.
- Identify the principal GOHFER workflows for well construction, log processing, DFIT interpretation, treatment simulation, production evaluation, and development optimization.
- Understand how multidisciplinary data are integrated to support calibrated engineering and economic decisions.

GOHFER features demonstrated

- Multiwell, multistage, and multicluster modeling for vertical, inclined, and horizontal wells, including longitudinal and transverse fractures.
- Well survey, coordinate-system, datum, structural-map, geosteering, and 3D mechanical-earth-model integration.
- Automated LAS processing, curve mapping, synthetic-log generation, mechanical-property estimation, and hydrocarbon corrections.
- DFIT and pumping diagnostics, treatment history matching, fluid/proppant libraries, perforation erosion, tortuosity, and screenout modeling.
- Stress shadowing, depletion effects, stage sequencing, fracture reorientation, production forecasting, rate-transient analysis, and economic optimization.

Engineering theory discussed

- Finite-difference transport with automatic time stepping and a stability-controlled Courant number; single-phase, multicomponent fluids and multiple proppant components.
- Shear-decoupled rock deformation based on a modified Boussinesq solution and fracture extension governed by Barenblatt process-zone stress rather than fracture toughness.
- Effects of anisotropy, tangential wellbore stress, pore-pressure depletion, effective stress, and cumulative stress interference on fracture initiation and propagation.
- Pressure-transient interpretation using G-function and after-closure behavior, including closure, fracture opening, variable transverse storage, leakoff, and reservoir flow regimes.
- Production interpretation through decline curves, flowing material balance, rate-transient/type-curve analysis, drainage area, effective fracture length, and net-present-value optimization.

Topic progression and approximate timestamps

Time	Topics discussed
00:00-07:12	GOHFER definition and history; deterministic numerical formulation; fluid/proppant transport; shear-decoupled deformation; process-zone stress; laboratory and field validation; differences from conventional simulators.
07:13-14:24	High-level capability tour: multiwell models, geosteering, stress shadowing, wellbore breakdown, pressure diagnostics, production forecasting, optimization, microseismic and fiber-data integration, and fluid/proppant libraries.
14:25-23:47	Well construction and petrophysics: coordinates, surveys, MD/TVD handling, LAS import, automated curve recognition, synthetic sonic and mechanical-property workflows, and hydrocarbon corrections.
23:48-32:31	DFIT diagnostics: G-function closure interpretation, fracture opening pressure, after-closure flow regimes, permeability and reservoir-pressure estimation, and limitations of pseudo-radial/Horner analysis.
32:32-39:14	Treatment simulation and matching: post-job schedule import, surface-pressure components, fracture-output summaries, flowing/propped area, time-dependent rheology, fluid libraries, and bottomhole-temperature effects.
39:15-47:46	Geosteering, subsurface structure, depletion, and stress orientation: LWD/reference-log correlation, 2D/3D structure, pore-pressure depletion, effective-stress recalculation, and fracture-azimuth implications.
47:47-57:52	3D earth-model interrogation, wellbore breakdown gradients, fracture-orientation analysis, wellbore stability, mud-weight limits, and calibration of rock-failure properties.
57:53-71:33	Perforation erosion, limited-entry allocation, stress-shadow-driven cluster shutoff, feed-rate and proppant-transport limits, tortuosity evolution, near-wellbore packoff, and screenout interpretation.
71:34-77:33	Reusable stage templates, multistage/multiwell sequencing, zipper-frac order, cumulative stress shadowing, fracture reorientation, and 3D visualization of fracture states and induced stress.
77:34-90:12	Production analysis and optimization: decline curves, rate-transient analysis, flowing material balance, drainage behavior, history matching, well/cluster-spacing sensitivities, economics, and integrated development planning.

Practical workflow illustrated

- Build the well and earth model from locations, elevations, directional surveys, logs, structure, and geomechanical inputs.
- QC and calibrate petrophysical and mechanical properties, then use DFIT and field data to constrain stress, process-zone stress, pore pressure, permeability, and near-wellbore losses.
- Create treatment schedules, perforation/stage designs, and chronological shadow order; simulate fracture propagation, allocation, erosion, tortuosity, and interference.
- Compare simulated and measured pressure behavior, review fracture geometry and effective conductivity, and connect model outputs to production performance.
- Use production history and economics to compare well spacing, cluster spacing, treatment size, sequencing, and development alternatives.