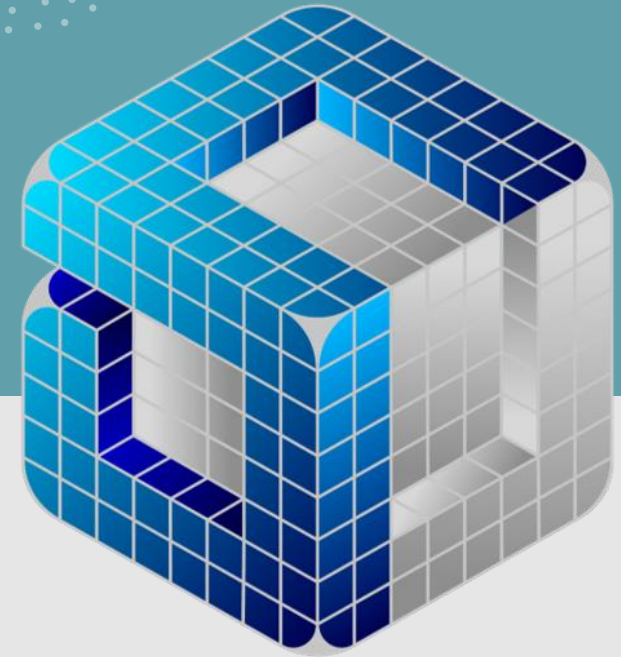




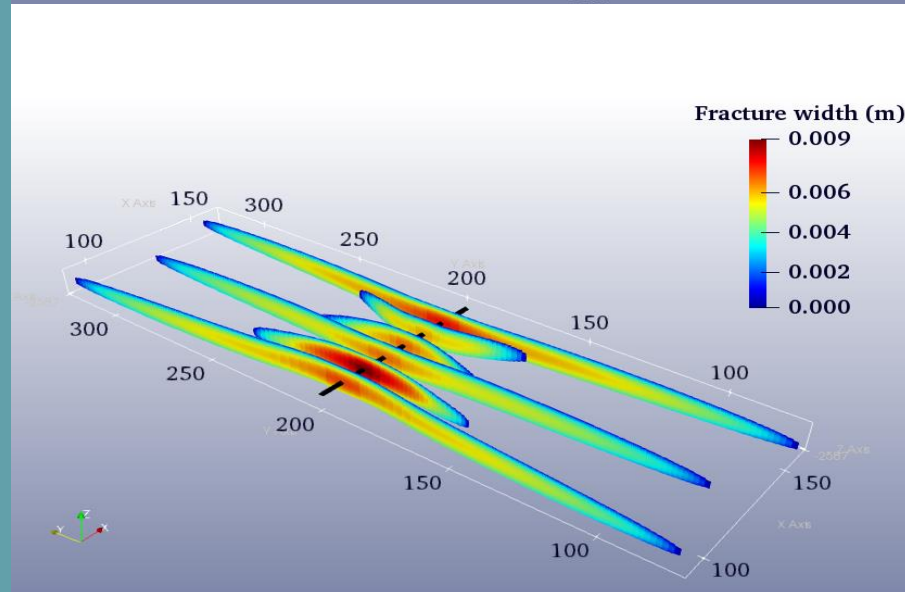
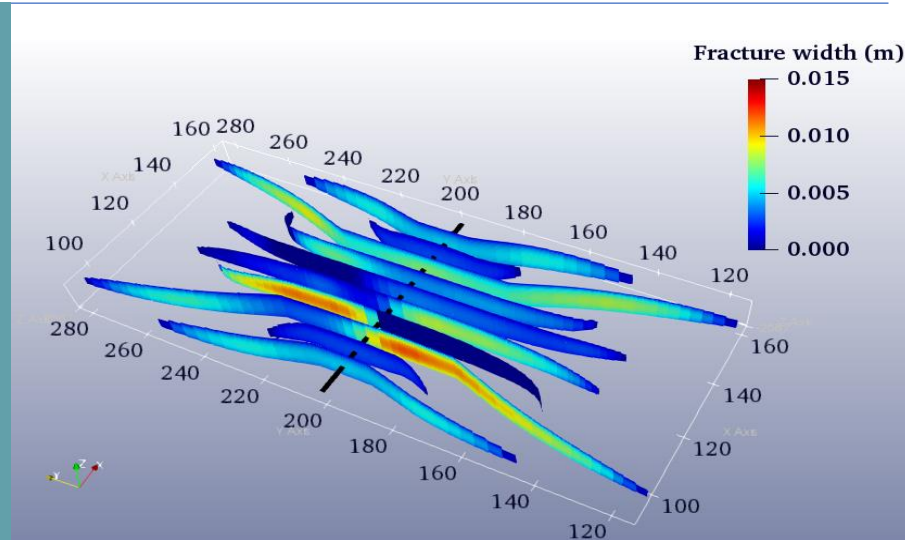
ZFRAC Non-planar Hydraulic Fracture Modeling and Simulation

- **ZFRAC** is the most powerful, comprehensive software solution available in the petroleum industry for the design, simulation, and optimization of hydraulic fractures and fracture stimulation treatments.
- **ZFRAC** honors the complexity of the reservoir.
- **ZFRAC** uses pseudo 3D displacement discontinuity method (DDM) and incorporates the physical behavior of rock deformation, fracture propagation, and fluid flow.
- **ZFRAC** handles any complex hydraulic and natural fractures effortlessly and efficiently to add precision and value to field operations.
- Over 5 years of continuous development and many field applications have led to the most complete physics-driven fracturing simulator in the world.



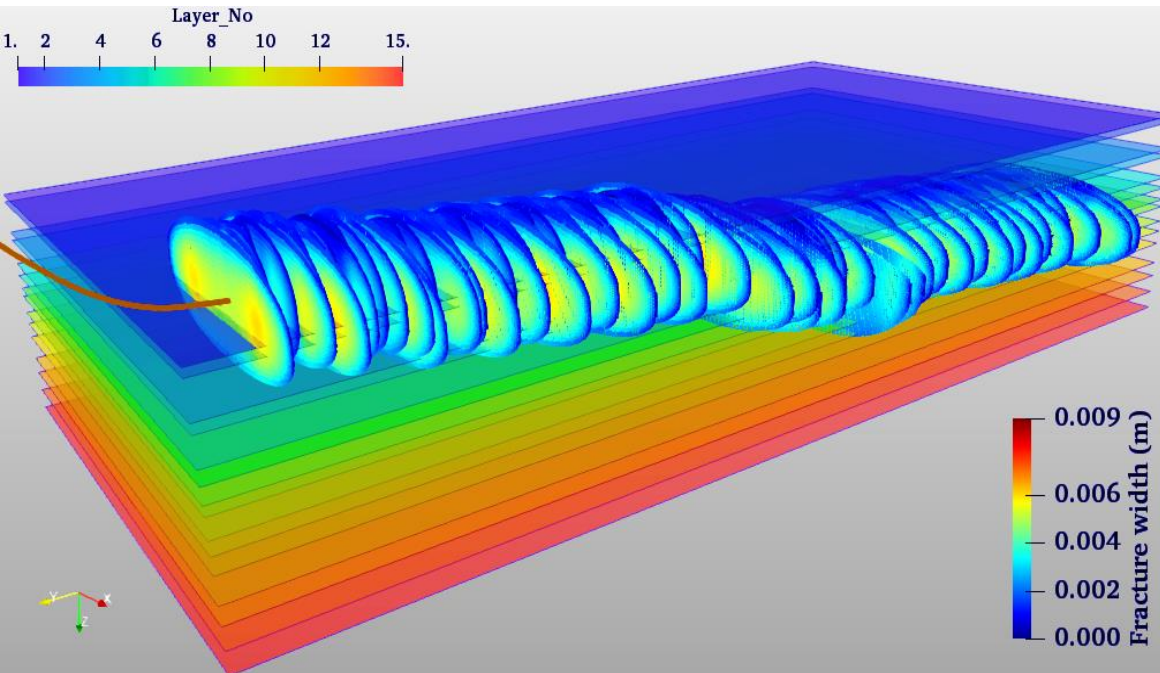
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- Multiple fractures can be easily modeled by the powerful ZFRAC software.
- Non-planar fracture geometries from various sources are captured.
- Natural fractures from both geomodel and stochastic generation can be used to evaluate the interactions of natural fractures with hydraulic fractures.
- Stress shadow effects among clusters and stages can be included in the stimulation treatment.
- Heterogeneous state of stress effect can be adopted to capture areal stress variations caused by tectonic stresses, depletion effects, etc.
- ZFRAC becomes the originator/pioneer software solution that incorporates diversion modeling.
- ZFRAC provides fast and efficient solutions for multi-stages/wells modeling as pressure history matching is performed to calibrate fracture mechanically.
- ZFRAC seamless transfers fractures to reservoir simulation for production forecasting and history matching.

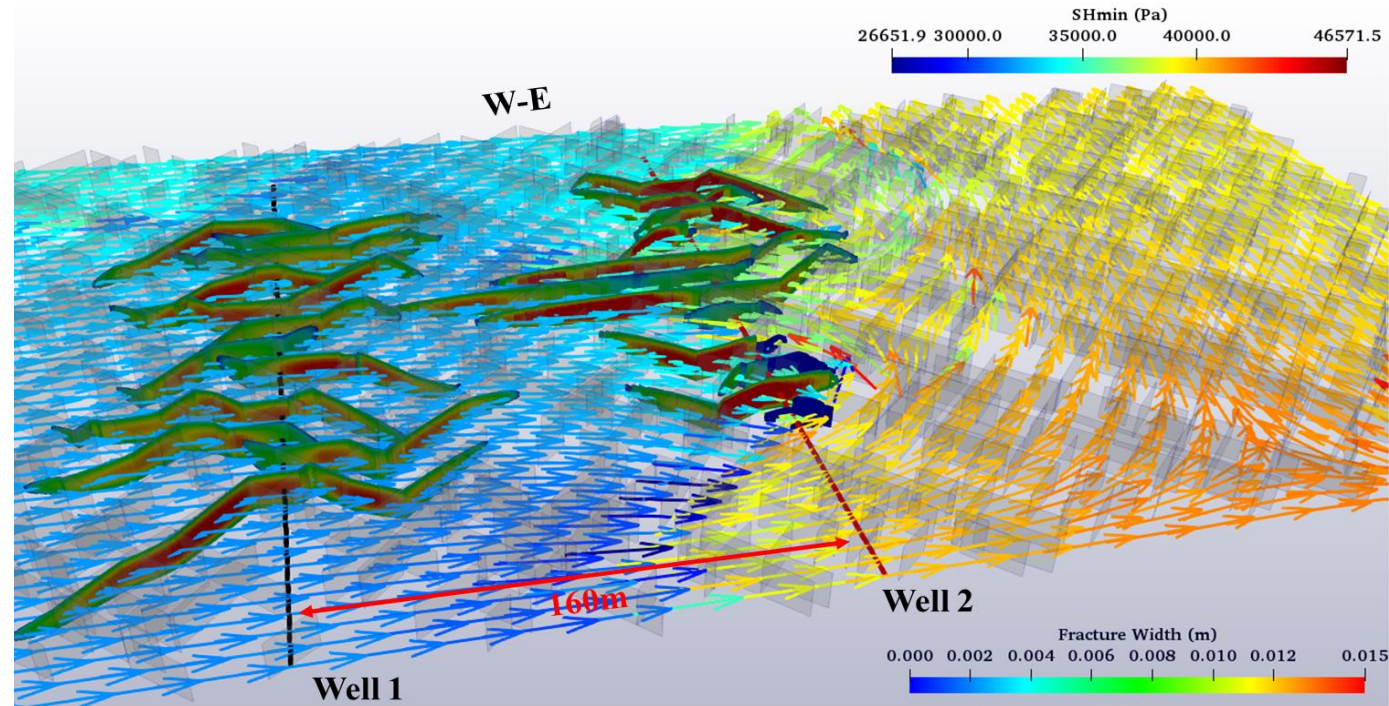


- Fast and efficient fracture modeling of horizontal well
- Well spacing optimization under heterogeneous stress

○ 15 stages with engineered completion design

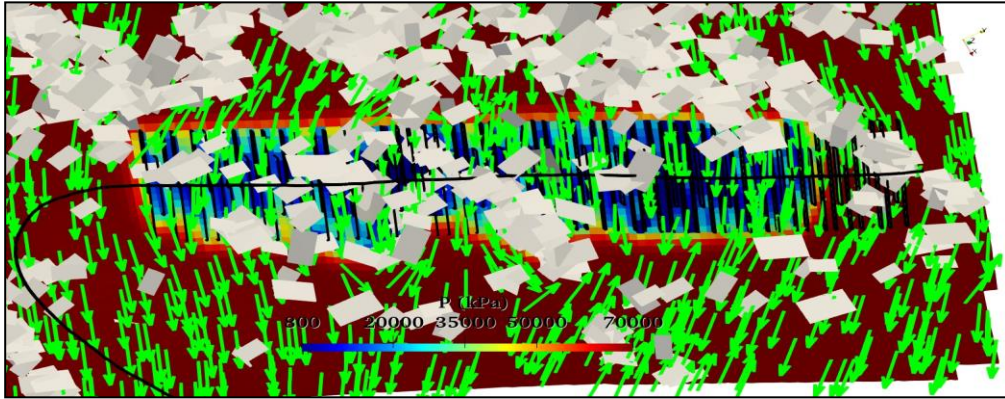


○ Depletion effect affects infill well fracture propagation

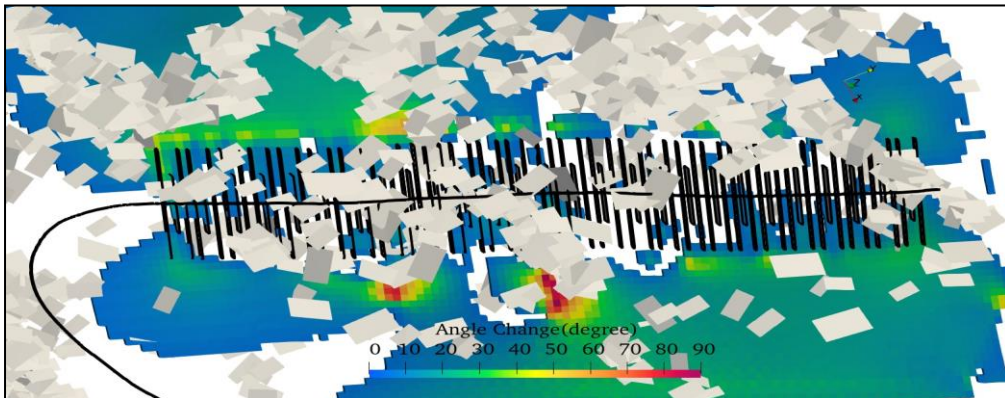


Well spacing optimization and multi-layer development

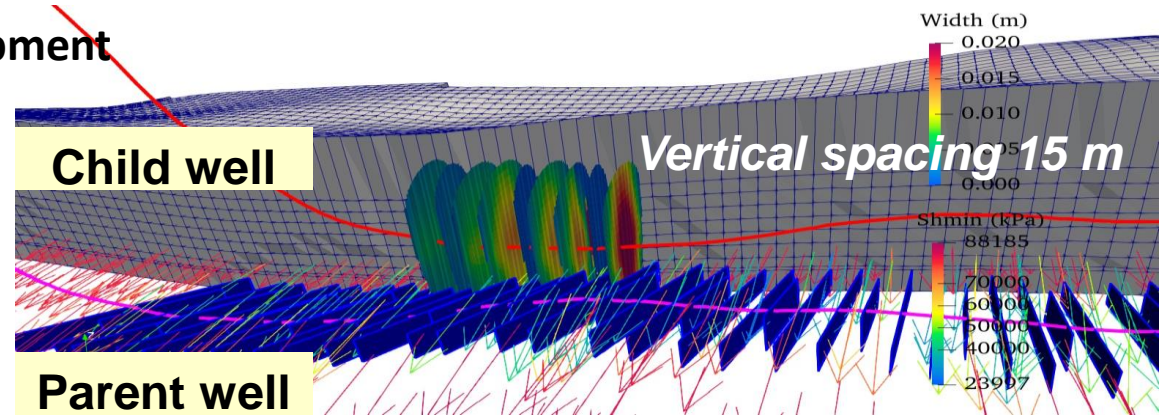
- Child well landing point planning for multi-layer development



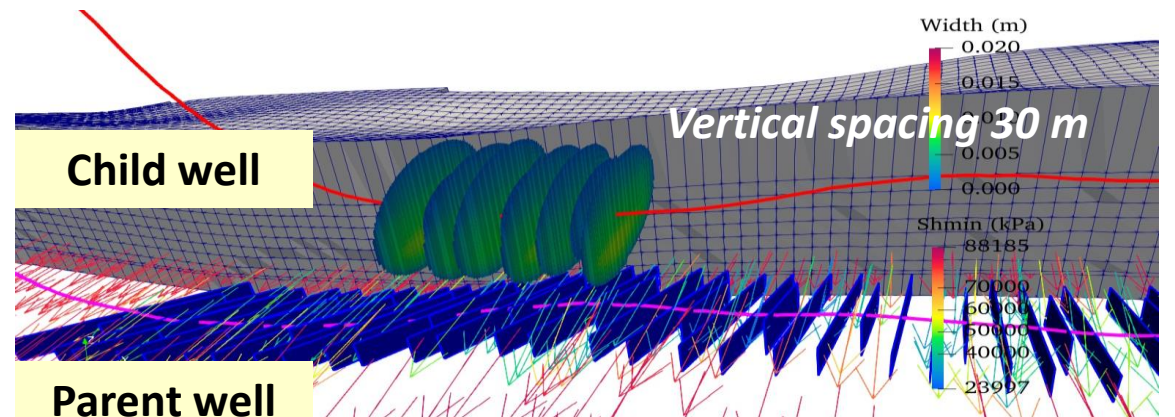
Stress direction change due to depletion



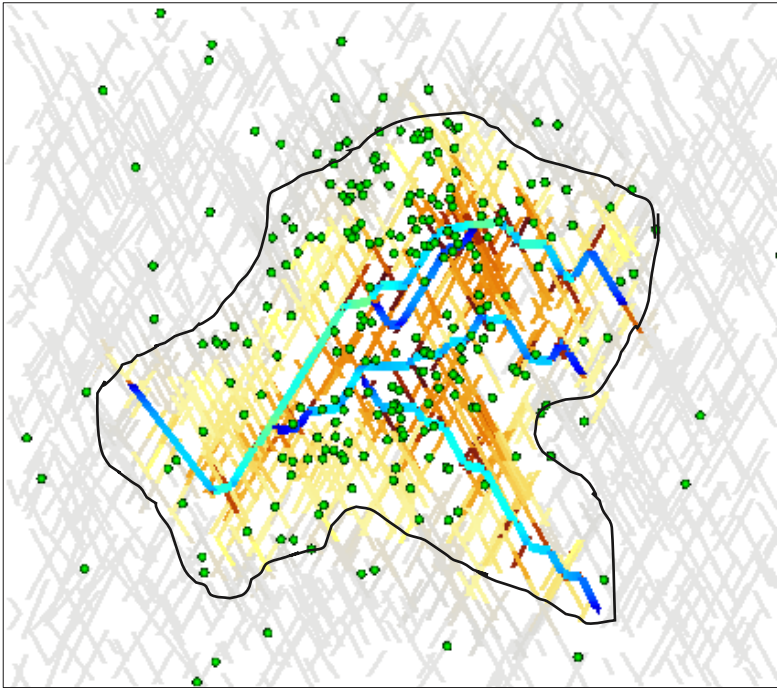
Stress angle change due to depletion



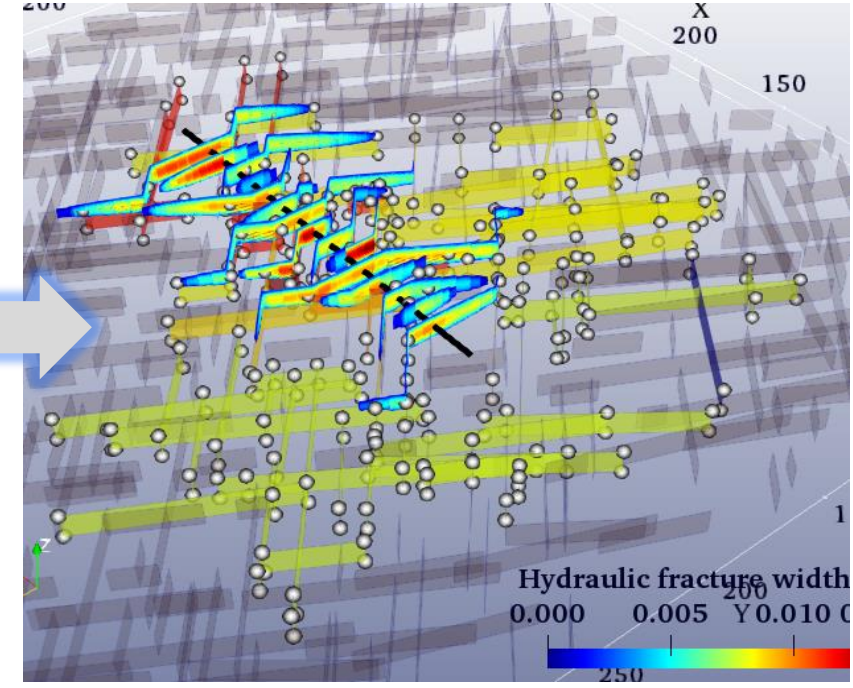
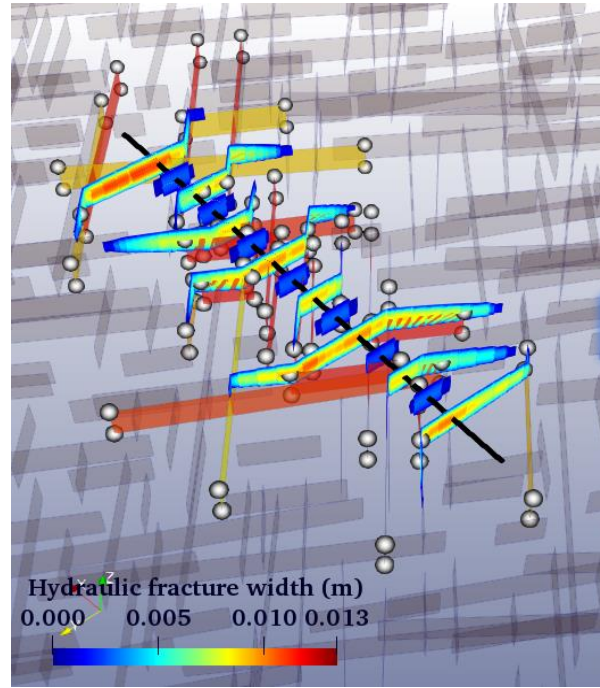
Parent/Child well fracture propagation



- Fracture network calibration using microseismic signals
- Complex fracture network microseismic signal prediction

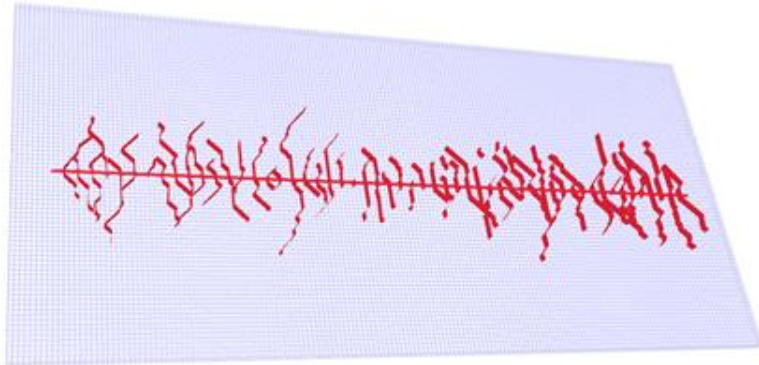


Fracture network vs microseismic signals

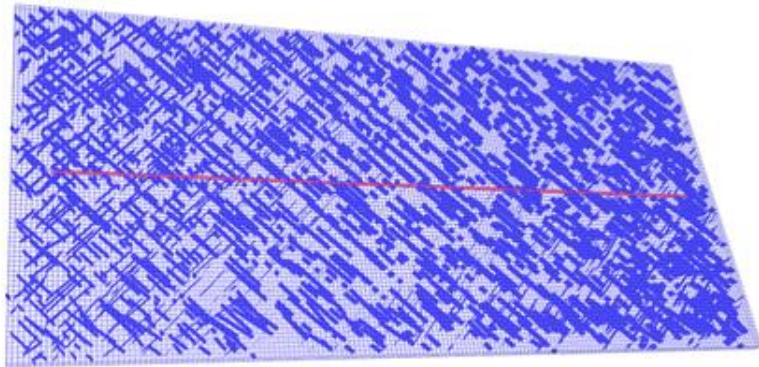


Simulated microseismic SRV before and after diversion

➤ Direct output from fracture model to production evaluation



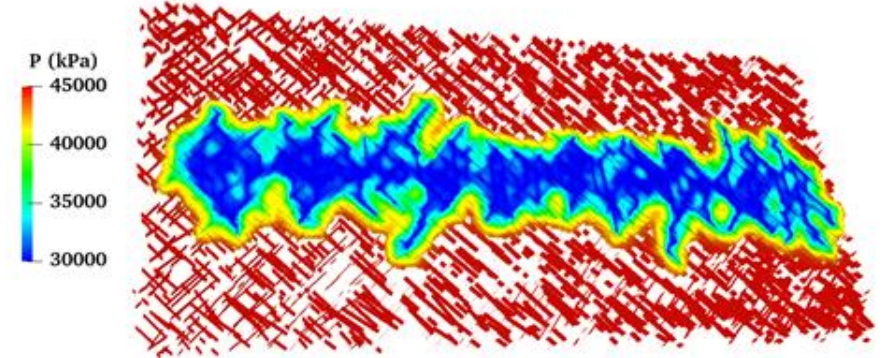
ZFRAC fracture models



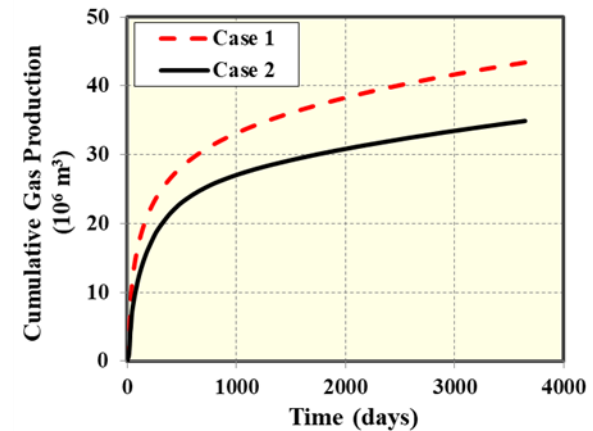
Original NF distribution



EDFM
+
Reservoir
Simulation



EDFM simulated SRV after 1 year of production



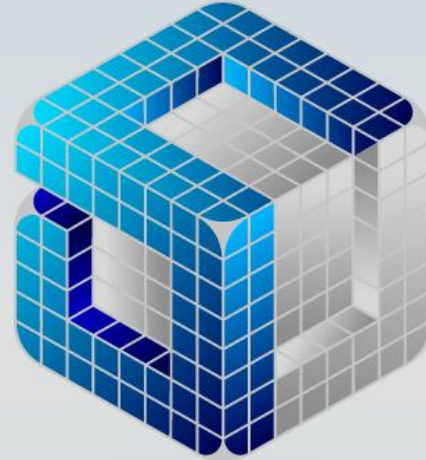
Post-EDFM production evaluation at various production scenarios



	ZFRAC	Kinetix	Gofher	Mfrac	Stimplan	FracOPT
Multiple fracture	●	●	●		●	
Non-planar fracture	●	●				
Natural fracture	●	●				
Stress shadow	●	●	●			
Heterogeneous stress	○	●				
Dynamic stress distribution	○					
Diversion	●					
Computational efficiency	●	●	●	○	○	○
Production calibration	○			○		
Third party interface	○		○			
User friendly	●	●	○	●		●
Real time data		○				●

○ Partially capable ● Capable

SimTech is open to share ideas and future projects with hundreds of professionals and academia peers, pushing boundaries of fractures and unconventional reservoir characterization. Our efficient technology is transcending oil and gas industry, and we want you to be part of it!



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