FracGeo
Translating Geologic Heterogeneity into Better Engineered Unconventional Wells

Dr. Ahmed Ouenes, CEO & Founder

As an engineer having occupied positions spanning consulting, software development, operating oil and gas fields, and academia, Dr. Ahmed Ouenes, CEO and Founder of FracGeo recognized the value of geosciences in understanding reservoir property variation along and between wells. Further, he researched technologies that harness this understanding to optimize engineering approaches to most profitably extract oil and gas. Everything else followed.

His brainchild, FracGeo is a provider of Shale Management solutions for sweetspot and landing zone selection, adaptive asymmetric frac design, engineered completions, frac hit mitigation and well spacing optimization in unconventional reservoirs. The firm, he says, "was a natural outgrowth of products and companies I had previously developed which addressed the challenges of geophysical and geologic modeling, including the modeling of natural fractures."

"With unconventional reservoirs, well performance is determined by our ability to create permeability through hydraulic fracturing and the stimulation of natural fractures. I saw the need for improved engineering tools that would capture reservoir variability," says Dr.Ouenes. For him, it was clear that the industry's factory mode development, which ignored variable reservoir properties, would not be sustainable.

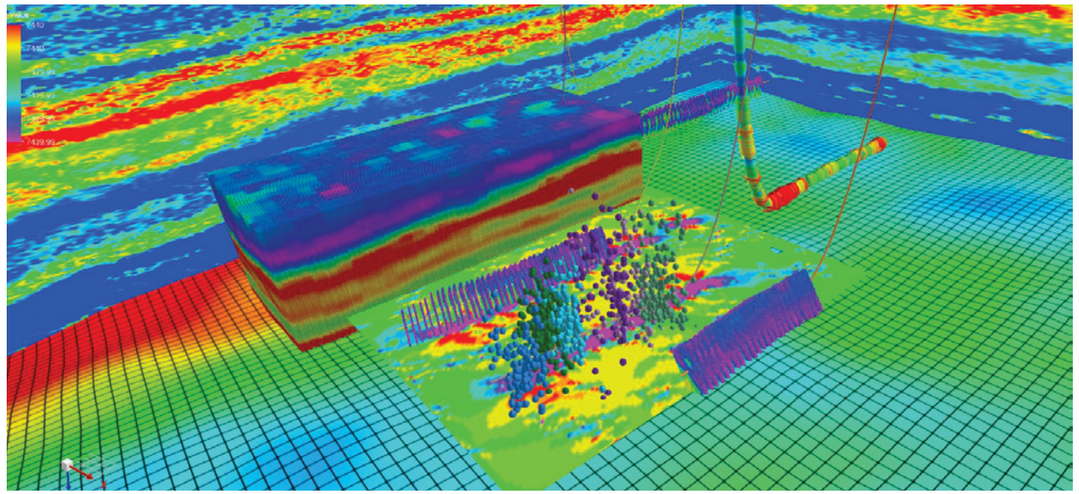
Existing tools did not fully utilize the data acquired, nor capture all the physics of unconventional reservoirs correctly, and the workflows offered were as siloed as many of the operating and service companies. "Only by developing new technology and workflows could we incorporate the geologic and geomechanical heterogeneity into engineering designs that would maximize the resource extracted from every well," says Dr. Ouenes. Fundamental to this shift would be a workflow which broke down the siloes between geoscience and engineering, using a new geomechanical simulation technology based on continuum mechanics augmented with discontinuities and solved numerically using the Material Point Method (MPM). This new disruptive geomechanical technology provides the mechanism of translating geologic heterogeneity into geomechanical stress and strain, which gave FracGeo the ability to constrain and thereby improve its Engineering design and well performance prediction tools.

Today, the company is positioned with a unique product enabling digital transformation to address the challenges facing operators.

FRACGEO, TRANSFORMING THE OIL INDUSTRY

One of the disruptive elements of FracGeo, according to Dr.Ouenes, is its multidisciplinary technology that enables the breaking down of the siloes between geoscience and engineering providing improved fracture treatment and well spacing strategies to increase the value of assets without expensive field trial and error. The firm's technology and workflow innovations have successfully extracted more value from the available data while providing the correct physics to answer various engineering questions ranging from near wellbore stress effects to far scale interference between wells.

Seamless workflow across disciplines is offered to geoscientists and engineers once the siloes are broken by the company's flagship FracPredictor platform. The heart of FracGeo's platform is the MPM-based geomechanical simulator that enables geophysical and geologic models to feed and seamlessly constrain engineering analysis, enabling the fast simulations needed for engineers to keep up with rig schedules.



FracGeo is also transforming the oil industry with its technological innovations in the areas of machine learning, geophysics, geomechanics, hydraulic fracturing, and reservoir simulation. Dr. Ouenes and his team improved the Artificial Intelligence based workflows he introduced three decades ago in reservoir modeling to include fracing parameters. The firm also recently introduced technology that facilitates the fast and reliable estimation of rock properties from pre-stack seismic data. Further, the company pioneered the use of the Material Point Method (MPM) to solve complex geomechanical problems at a scale ranging from an area around a well to the entire state of Oklahoma for induced seismicity prevention. The firm introduced a 3D grid-based frac simulator constrained by geomechanical results and spatially varying rock properties, as well as stress shadowing between stages and wells. Moreover, in reservoir simulation, FracGeo introduced the asymmetric tri-linear model constrained by the results derived from the frac simulator to predict the well performance combined with a Fast-Marching Method (FMM) simulator to capture the resulting reservoir depletion which is used to optimize the frac design and spacing of a child well to mitigate risk of frac hits and well interference.

DRIVEN BY INNOVATION

Catering to the needs of its clients with every development, FracGeo understands the challenges faced and rapidly innovates solutions. The DrillPredictor module was developed to extract critical information from surface drilling data owing to its client's requirements, as many did not have the information needed to properly geosteer their wells, or to geoengineer their completions.

FracGeo worked with one of its international clients that encountered an unusual issue. When the operator paused for many days while fracing one of their wells, they noticed that the production was higher than neighboring wells. FracGeo added visco elasticity to their existing elastic and poro-elastic geomechanical solutions to help the client better understand the field observations.

Recently, FracGeo introduced Anisotropic Damage Mechanics to solve 2D and 3D hydraulic fracturing problems and has continued to leverage its multidisciplinary experience, and diversity to bring robust solutions to addressing oil and gas challenges.

"The fuel driving the innovation is the people at FracGeo," says Dr.Ouenes "At FracGeo, we are ordinary and humble people but make extraordinary science and commercial software with only a very small fraction of the R&D budget spent by large organizations"

A PROMISING FUTURE

FracGeo innovation is tested and illustrated on real field data and often shared with the industry in technical publications. Since its launch in 2014, FracGeo published more than 40 technical articles describing the application of its advanced technologies on actual field studies. One of these publications lead to FracGeo receiving the EAGE 2017 Anstey Award.

FracGeo innovation is secured with four published pending patent applications and many trade secrets included in its software.

FracGeo's future is focused on strengthening its partnerships with organizations that share the same vision, to deploy its software in all parts of the world addressing unconventional resources and to continue its innovation by pioneering advanced technologies that will address the urgent needs and challenges of E&P companies. CR