

Multi-Frac-3D

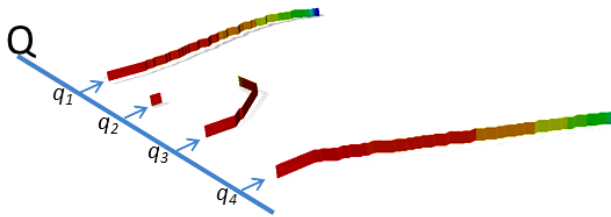
A Geomechanics Pad-Scale Fracturing Simulator
for Unconventional Oil & Gas Resource Development

What is Multi-Frac-3D?

Introduction

Multi-Frac-3D is a PC and cluster-based simulator for designing and optimizing hydraulic fracturing in pad-scale operations. It has the following capabilities:

- ◆ 3-D, poro-elastic reservoir mechanics
- ◆ Multi-phase reservoir fluid flow
- ◆ Thermal convection and conduction
- ◆ Reservoir heterogeneity characterization
- ◆ Non-Newtonian fluid driven fracture propagation
- ◆ Proppant transport including proppant retardation and settling
- ◆ Competitive fracture growth using fluid and proppant distribution algorithms and implicit inter-fracture stress interference.



Who should use Multi-Frac-3D?

Industry application

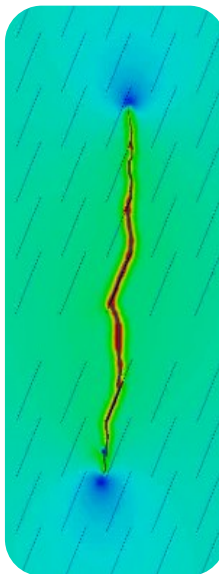
Multi-Frac-3D has been designed to be used by Completions Engineers, Production Engineers and Reservoir Engineers. Multi-Frac-3D has been successfully used to optimize fracture spacing, fracture sequencing, and well spacing for unconventional plays such as - Barnett, EagleFord, Bakken, Marcellus, and Permian. With these various projects, Multi-Frac-3D has been proven to guide clients to increase EUR of their assets.

Why use Multi-Frac-3D?

Unique features

Multi-Frac-3D has the following unique features:

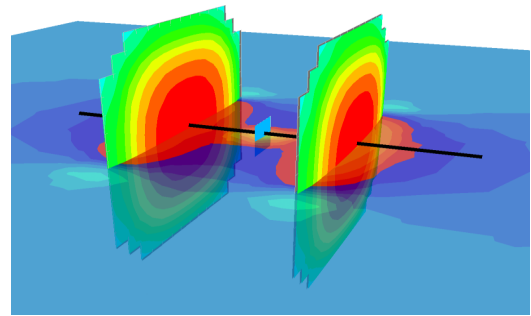
- ◆ Simulate interaction between fractures in parent-child wells
- ◆ Simulate various field operations such as zipper-fracturing involving multiple wells
- ◆ Analyze inter-well and inter-stage fracture interference effects
- ◆ 2-D and 3-D fracture propagation allowing for fracture turning and prediction of number of active clusters per stage
- ◆ Implicit fracture-reservoir coupling allows for a streamlined workflow to forecast production of simulated fractures. This avoids the cumbersome transfer of fracture dimensions from a fracture simulator to a reservoir simulator.
- ◆ Dynamic mesh refinement allowing for accurate analysis of near fracture physics.
- ◆ Distributed domain parallelization allowing for large-scale 3-D simulations.



How does Multi-Frac-3D work?

Under the hood

Multi-Frac-3D is based on FROGG (Framework for Research and Operations in General Geomechanics) libraries that have been developed at the University of Texas at Austin over the past 15 years. Multi-Frac-3D uses finite volume (FV) discretization of the reservoir and finite area (FA) discretization of the fractures. The two systems are tightly coupled using an iterative implicit algorithm. Please contact us to know more about the technical details of the simulator.



How to use Multi-Frac-3D?

A standardized, easy-to-use and flexible interface

The user interface for Multi-Frac-3D was designed to offer the simplest user experience.

- ◆ **Inputs** – Multi-Frac-3D allows users to import data into the simulator from standard industry formats. Interaction between Multi-Frac-3D and various reservoir simulators is also possible to promote development of integrated workflows.
- ◆ **Results** – A standout feature with the Multi-Frac-3D interface is its emphasis on results – both their interpretation and visualization. Our interface offers an integrated comparative analysis. The start-of-the-art graphics engine included in Multi-Frac-3D provides the user with impressive visualizations of their simulation results for use in reports and presentations. The simulation results of Multi-Frac-3D consist of graphs, charts, contour plots, full 3D visualization and animation videos.

How to use our expertise?

Consulting services to provide customized solutions

Multi-Frac-3D empowers the user with quick analysis and design of fracturing projects. You can also take advantage of our experience and get targeted answers to your projects. We can customize the output results based on the requirements of the projects hence granting you more flexibility with visualization and analysis of the project results.

About us

Multi-Frac-3D has been developed by Dr. Ripudaman Manchanda, Ajeetha Kamilla, and Prof. Mukul M. Sharma.

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