Stimulated Reservoir Volume –
Understanding propped and unpropped fractures

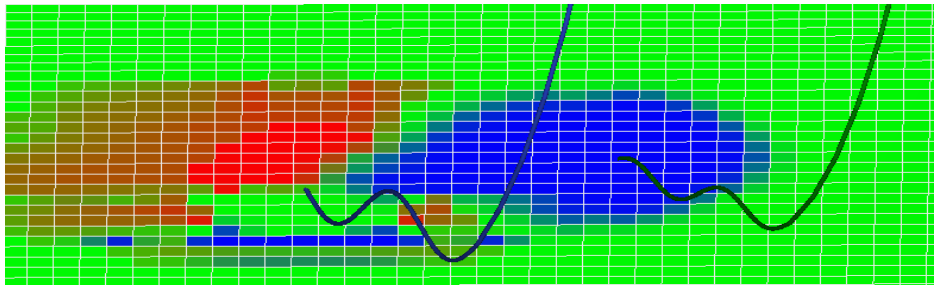
6X: Modeling the Propped and Unpropped Stimulated Reservoir Volume

Hydraulic fracture designs continue to focus on increasing intensity to create larger stimulated reservoir volumes (SRV) through the combination of increasing proppant mass and fluid volume. With denser fracture distributions we see growth of multiple hydraulic fractures through bifurcation. The fracture distribution and hence shape of the SRV reflects reservoir heterogeneity as well as the stimulation design. Finer sand is typically pumped first followed by coarser sand, propping the created fracture geometry. Even so, many of the finer fractures and spatially distant fractures do not receive proppant and close unpropped. 6X models the unique opening, propping, closure and dynamic fracture conductivity for both the propped and unpropped fractures that form the SRV.

How do you assess your SRV in 6X?

The unique Implicit Stress Solution in 6X models the dynamic change in mean stress as a hydraulic fracture treatment is pumped. The simulator models the fracturing of the rock through the formation and subsequent propagation and growth of hydraulic fractures. Tracers are used to represent the fracturing fluid and proppant concentration in the hydraulic fractures. Fluid density, proppant density and bulk density control the proppant trapping resulting in a propped fracture; proppant gravity settling is modelled using the particle density. Should the propping criteria not be met, through insufficient proppant bulk density or the insufficient fracture width relative to the proppant particle diameter, the fracture remains stimulated but unpropped.

6X tracks the propped and unpropped hydraulic fractures that form the SRV. The user will see a hit from a child well on a parent in the form of a pressure pulse that has passed through the SRV.



Once pumping is completed, and the pressure distribution stabilizes, the rock compressibility model causes closure of the fractures. A propped fracture will maintain significant fracture conductivity. In comparison, an unpropped fracture will close quickly and will have minimal, fracture conductivity.

On completion of the treatment schedule, a production forecast can be run. The net stress increase is modeled as the reservoir depletes and the fractures continue to close with time. The model can be calibrated to observed data, and different SRVs evaluated.

6X Stimulated Reservoir Volume Parameters:

- Dynamic stress change through SRV stimulation and depletion
- Proppant and fluid pump schedule
- Proppant transport model and proppant trapping
- Fracture conductivity change as fractures open and close
- Optimize SRV size and propped volume adjusting cluster spacing, clusters per stage and design volumes

Optimize your Stimulated Reservoir Volume with your latest stage and cluster design to improve drainage efficiency and optimize well spacing. See the shape of the parent and child SRVs and minimize parent-child interference while maximizing the value of drill spacing units.

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