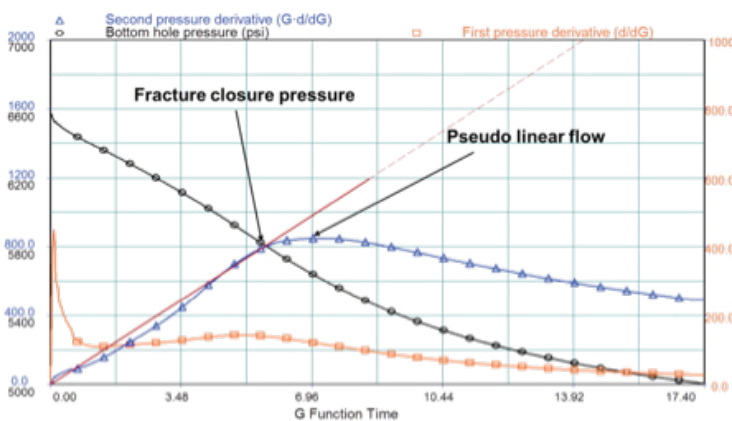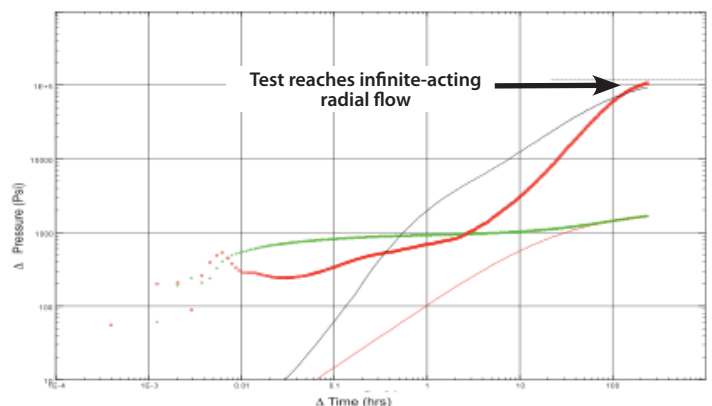# Is there a way accurate reservoir properties of a well can be identified?

*A **diagnostic fracture injection test (DFIT)** can assist in identifying the fracturing characteristics of your formation allowing you to be better prepared for each stimulation treatment. Additionally, a DIFT with adequate data can provide accurate measurement of average reservoir permeability and pressure.*

What is it? A small volume injection (2,000 – 5,000 gallons) followed by an extended pressure fall-off period in which pressure is recorded with surface or bottom hole digital gauges. Minimal personnel and equipment are needed to perform these tests, as only a pump truck and a gauge (that can be attached directly to the wellhead) are required.

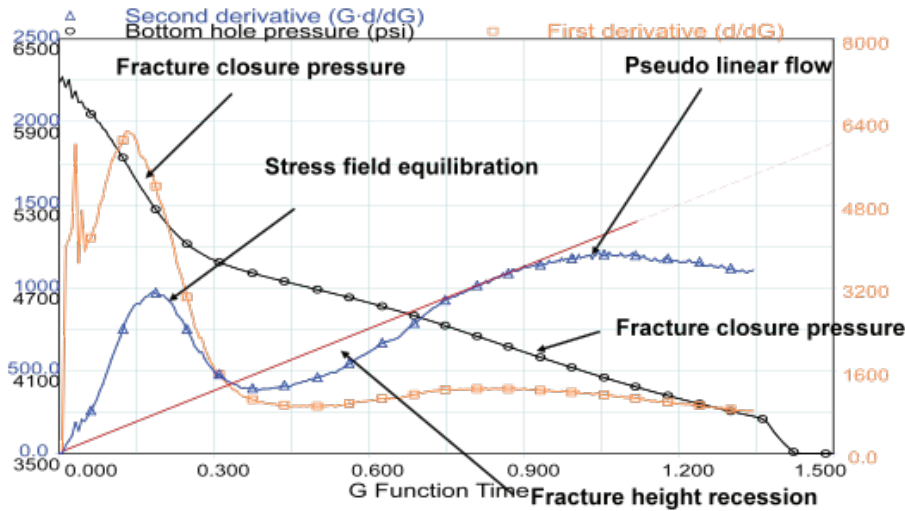Injection test pressure fall-off analysis: G-Function plot

Post closure diagnostic log-log plot

How does it help? DFIT data is analyzed to determine:

- Fracture closure pressure
- Leakoff
- Average reservoir pressure
- Fracture initiation pressure
- Average reservoir permeability
- Anticipated fracturing character

Data derived from a DFIT is useful in fine tuning fracture treatment designs and execution. The observed reservoir parameters are also an inexpensive means to provide direct measurement of properties as compared to processed (calculated) petrophysical logs.

Performing a DFIT prior to completion of your well can help optimize your completion program by identifying important characteristics of your reservoir and completion approach prior to treatment, potentially saving thousands of dollars by not having to address issues once fracturing operations have commenced.

Second derivative (G·d/dG) △
Bottom hole pressure (psi) ○
First derivative (d/dG) □

Fracture closure pressure
Pseudo linear flow
Stress field equilibration
Fracture closure pressure
G Function Time
Fracture height recession

The G-Function plot is an excellent diagnostic tool to determine the fracturing characteristics of a completion.

Note how the pressure fall-off character changes with injection volume. This is an indication of fracture complexity.
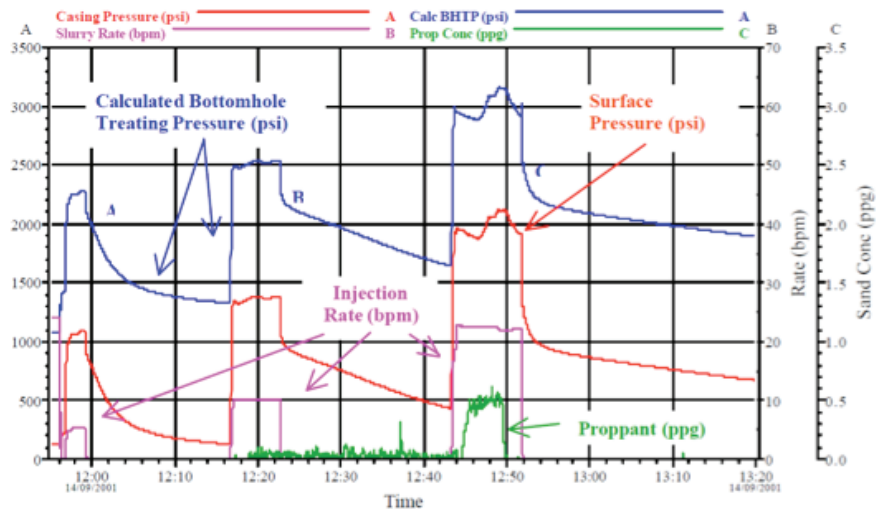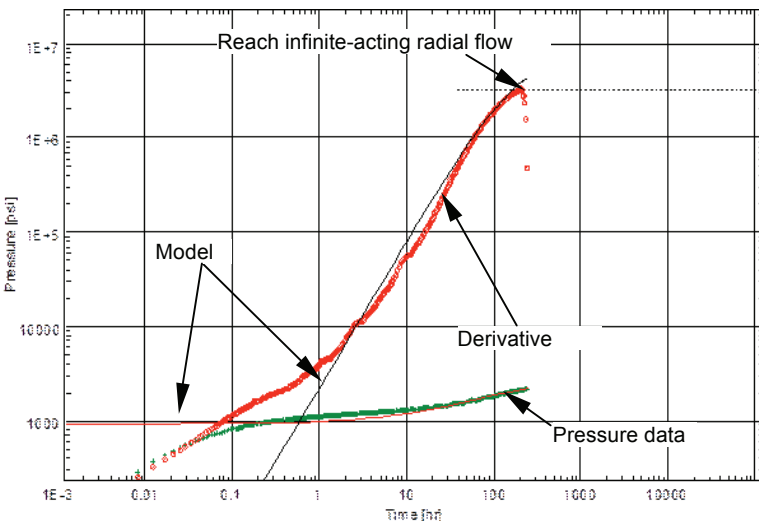

Casing Pressure (psi) — A   Calc BHTP (psi) — A
Slurry Rate (bpm) — B   Prop Conc (ppg) — C

Calculated Bottomhole Treating Pressure (psi)
Surface Pressure (psi)
Injection Rate (bpm)
Proppant (ppg)

Fig. 8–Execution of the Three-Stepped Injection Test Sequence, Case C

Reach infinite-acting radial flow
Model
Derivative
Pressure data

Average reservoir permeability and average reservoir pressure can be determined with post closure data. To improve uniqueness, these values must agree with pre-closure parameters.