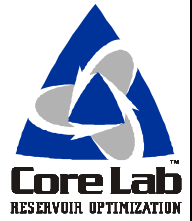


Carbonate Reservoir Fracture Treatment: Acid or Propped?



Fractures are important conduits for oil and gas flow to producing wells. Fracture closure due to stress acting on fracture walls can catastrophically impair well productivity. Determination of fracture conductivity versus closure stress is critical for determining which treatment is needed in carbonate reservoirs. Core Labs performs laboratory tests that provide vital reservoir-specific information as to whether the reservoir should be acid or proppant fracture treated.

FRACTURE DESIGN

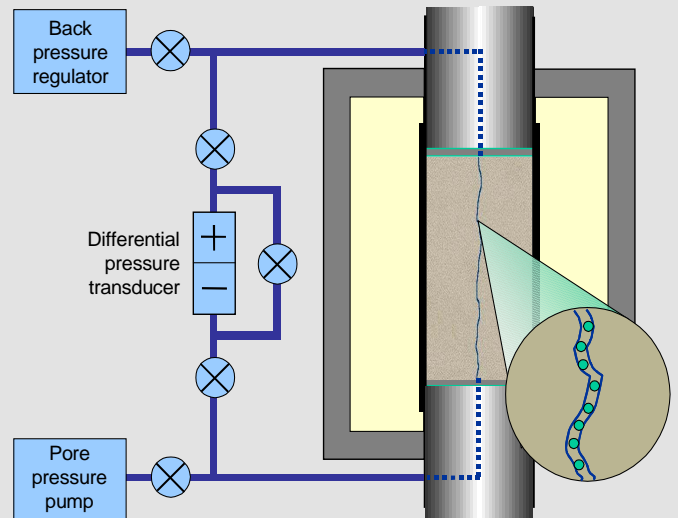
Problems:

- Poor selection of fracture treatment for carbonate wells
- Excessive closure stress in acid fractured reservoirs can result in early production decline
- Proppant embedment reduces fracture width and lowers fracture conductivity
- Chalk influxes due to acid fracturing in carbonate rock may reduce fracture conductivity

Laboratory Solutions:

- Enhance production associated with improved fracture conductivity
- Relative comparison of acid and proppant conductivity on same sample leads to selection of best treatment
- Rock mechanics data is required in both acid and propped fracture treatment designs

Fracture Conductivity Test Apparatus



Fracture conductivities are measured on core plugs with acid etched and propped fractures under formation stress conditions.

Benefits of proppant treated fracture conductivity:

- Proper proppant selection can reduce embedment and enhance recovery
- High fracture conductivity serves as a 'superhighway' for conducting reservoir fluids to the wellbore
- Proppant holds the fracture open and provides a permeable path for the oil or gas to flow to the wellbore

Benefits of acid treated fracture conductivity:

- Stimulates low permeability carbonates by increasing conductivity
- Less expensive and less time involved than proppant fracturing
- Less complicated because no propping agent is used

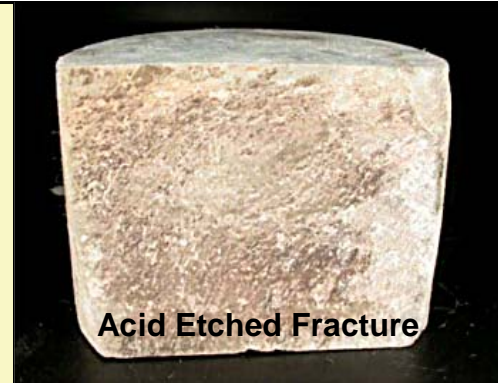
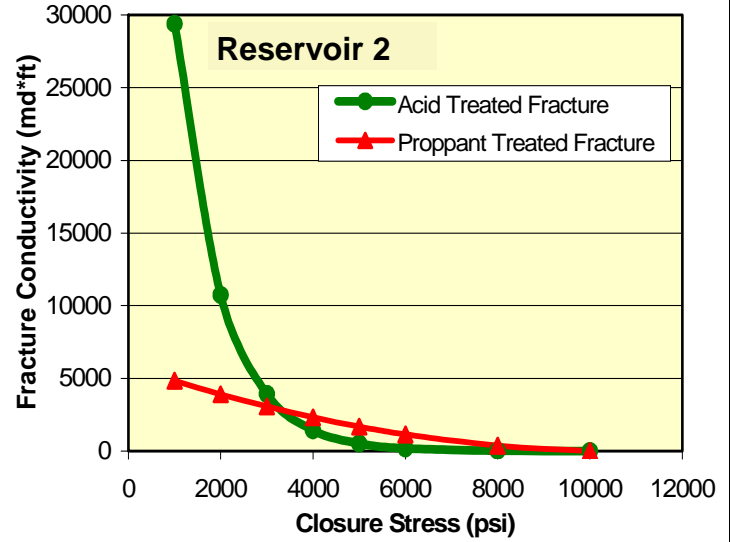
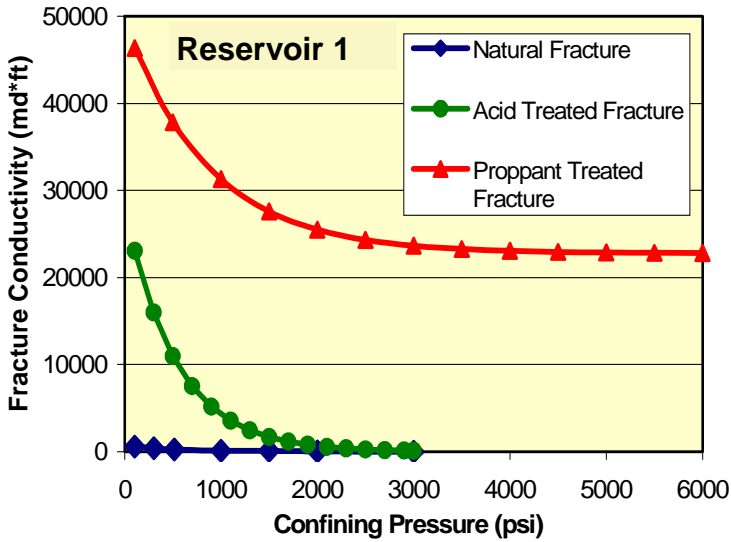
Case History

- These techniques have been studied and published in SPE journals for several years.
- They have been successfully applied worldwide on numerous wells with major productivity improvement at significant cost savings.



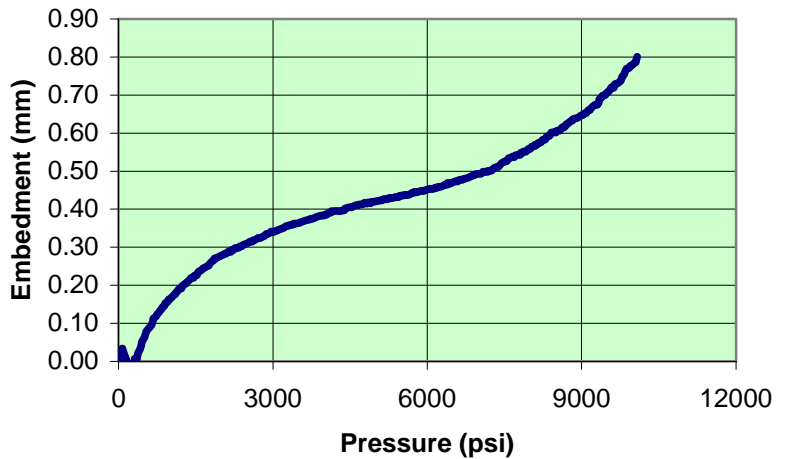
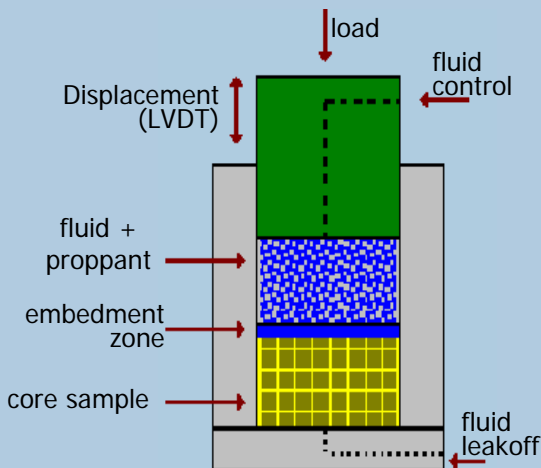
Fracture conductivity test

The best approach to fracturing depends on reservoir rock mechanical properties. Core Lab provides core-based data to assess whether acid treatment or propped fracture is best for an individual reservoir.



Proppant Embedment Test

When proppant particles penetrate the walls of the fracture, the effective width of the fracture and the fracture conductivity are decreased. Proppant embedment can reduce fracture width up to 60% with subsequent reduction of productivity from oil and gas wells.



Proppant embedment reduces fracture width and fracture conductivity due to fines generation.

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