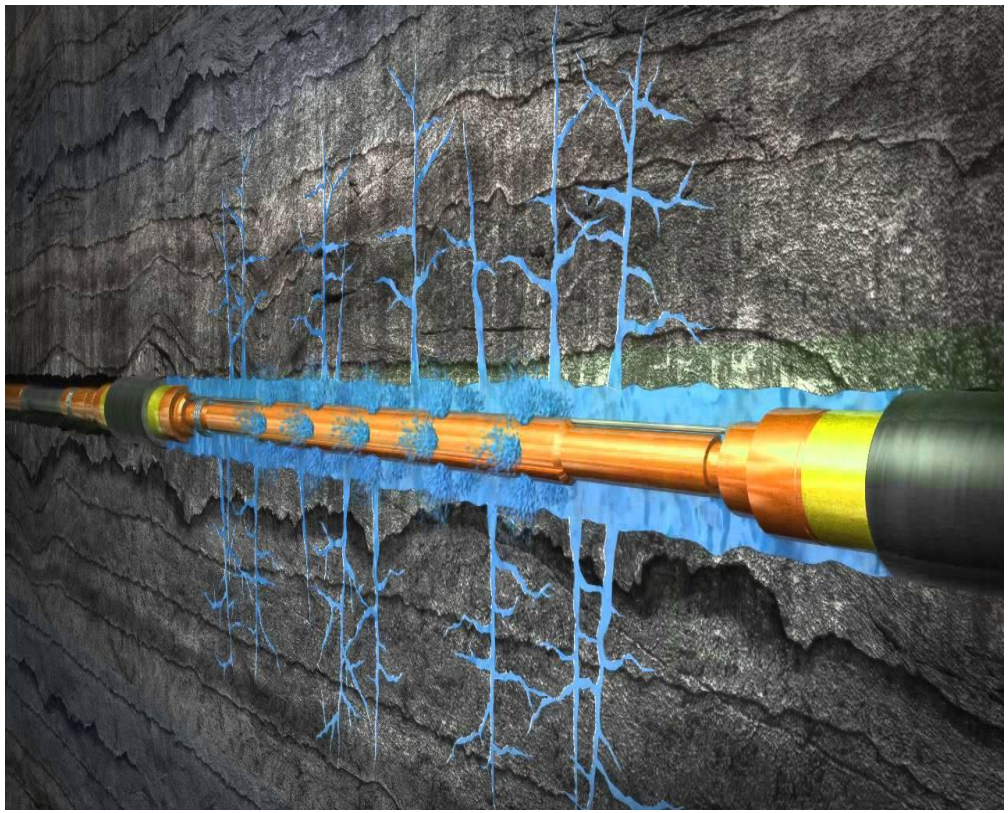
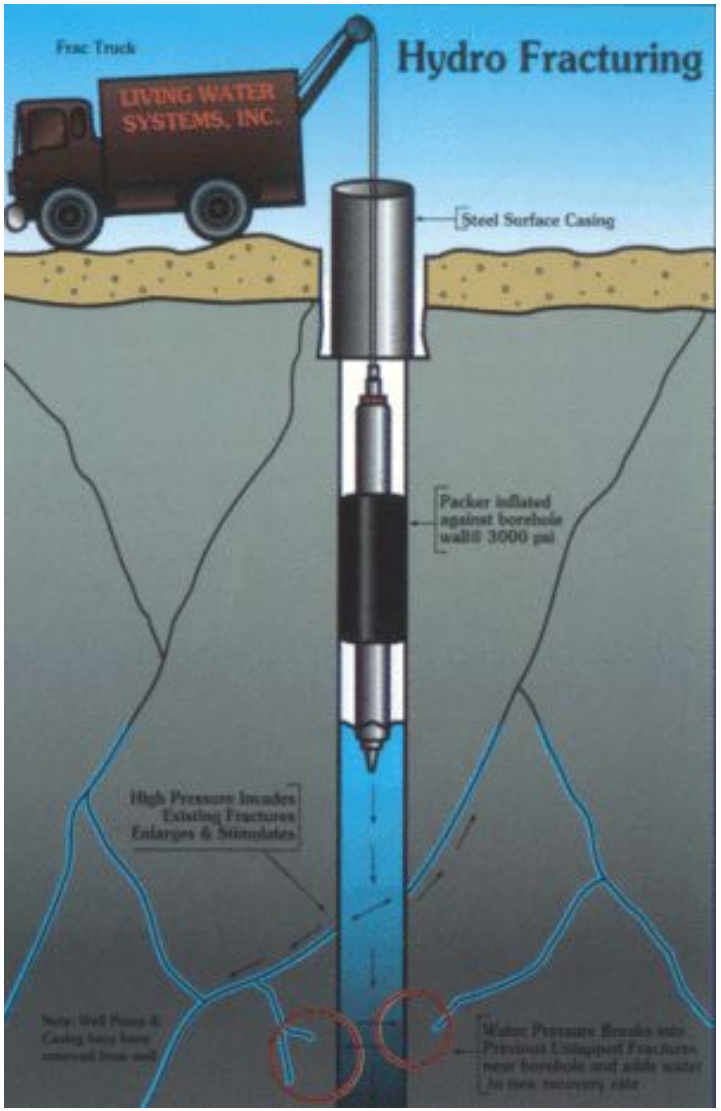
Hydraulic Fracturing

Akhmetshin A.A

Hydraulic fracturing (also known colloquially as “fracing,” or “fracking,”) is a technique used to stimulate production of oil and gas after a well has been drilled. It consists of injecting a mixture of water, sand, and chemical additives through a well drilled into an oil- or gas-bearing rock formation, under high but controlled pressure.



The process is designed to create small cracks within (and thus fracture) the formation, and propagate those fractures to a desired distance from the well bore by controlling the rate, pressure, and timing of fluid injection.



Hydraulic fracturing can be broadly defined as the process by which a fracture initiates and propagates due to hydraulic loading (i.e., pressure) applied by a fluid inside the fracture.

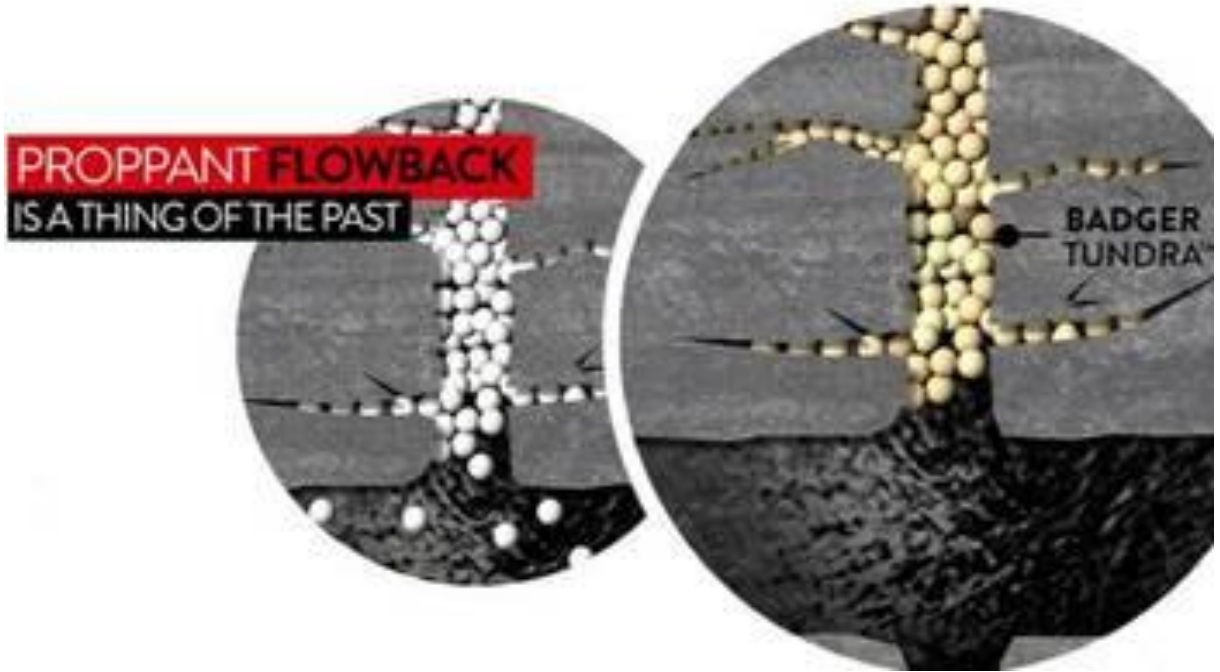
Hydraulic fracturing is a complicated process to model, as it involves the coupling of at least three processes:

- the mechanical deformation induced by the fluid pressure on the fracture surfaces;
- the flow of fluid within the fracture;
- the fracture propagation

Proppant

A proppant is a solid material, typically sand, treated sand or man-made ceramic materials, designed to keep an induced hydraulic fracture open, during or following a fracturing treatment. It is added to a fracking fluid which may vary in composition depending on the type of fracturing used, and can be gel, foam or slickwater–based.

In appearance, Propants are sand the size of a large poppy seed with a diameter of 0.5 - 1.2 mm



POSSIBLE PROBLEMS

- prediction of fracture geometry
- effective prevention of crack closure
- optimal choice of fracturing fluid
- fluid leak-off
- avoid screenouts caused by proppant a
- bridging and holdup
- proppant flowback

Hydraulic fracturing is one of the key methods making their extraction economically viable. The multi-stage fracturing technique has facilitated the development of shale gas and light tight oil production in the Russian Federation and is believed to do so in the other countries with unconventional hydrocarbon resources.

Conclusion

Hydraulic fracturing and horizontal drilling apply the latest technologies and make it commercially viable to recover shale gas and oil.

Thanks for the attention!