

# Fracture closure pressure evolution prediction in water-injection wells using hydrogeomechanical modeling

*I.S.Bazyrov<sup>1,2</sup>, S.V.Lukin<sup>2</sup>*

<sup>1,2</sup>*Saint-Petersburg Mining University, Saint-Petersburg, Russia*

<sup>2</sup>*Gazprom Neft's Science and Technology Center, Saint-Petersburg, Russia*

Nowadays one of the most effective technologies for the development of oil and gas reservoirs is the drilling of horizontal wells with multi-stage hydraulic fracturing. At the same time, the development of such reservoirs is accompanied by intensive water-flooding of wells with high injection pressures. Horizontal wells with multi-stage fractures are also converted to injection wells. If in such wells to exceed the critical fracture pressure the fractures formed during the hydraulic fracturing will begin to grow in length increasing the risks of early water breakthrough. It is worth noting that the value of fracture closure pressure is not constant, it is a function of pore pressure and is controlled by the current stress-strain state of the rock. The stress-strain relations in porous media where pore pressure changes can be described by the following equations [1]:

To solve the problem of fracture evaluation hydrogeomechanical modeling was applied. The algorithm for the coupled hydrogeomechanical modeling is shown in figure below.

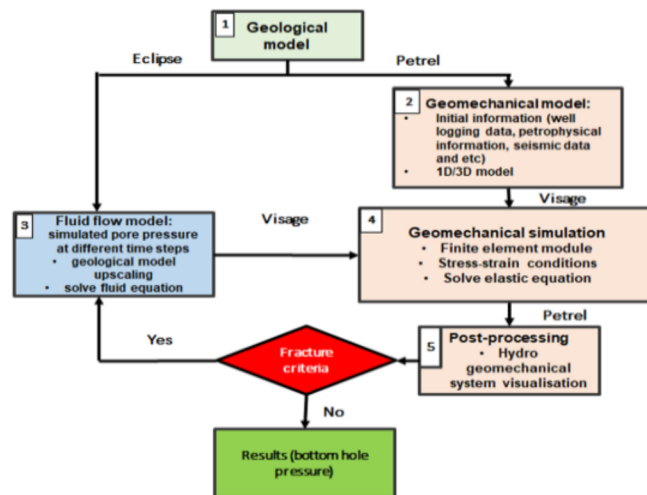


Figure. Algorithm of coupled hydrogeomechanical model construction.

## References

- [1] Fjaer E., Holt R.M., Horsrud, P., Raaen A.M., Risnes R., Petroleum related rock mechanics, Elsevier, 2008, 492 p.