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Тези

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MAXIMIZING WELL PRODUCTIVITY BY USING MULTILATERAL WELLS

This study involves hydrocarbon production optimization with flow simulation of an oil field produced by a multilateral well. Multilateral wells represent an advanced well technology that has demonstrated the potential to enhance well productivity significantly. By drilling multiple lateral branches from a single wellbore, this technology enables operators to access numerous reservoirs and increase the contact area between the wellbore and the target zone, thereby improving oil and gas recovery rates, reducing drilling costs, and minimizing the environmental impact.

Raghavan and Joshi (1993) presented a mathematical model that can predict the productivity of main wellbore wells. The model uses an effective wellbore radius (horizontal radial flow) to simulate fluid flow to the horizontal drain holes.

Retnanto and Economides (1996) published a simple formulation of multilateral well productivity for pseudo-steady-state flow. They derived their formulation by combining a one-dimensional linear flow model with a two-dimensional radial flow model to cover the drainage area. Larsen (1996) proposed a mathematical model similar to that of Raghavan and Joshi (1993) in that horizontal drain holes simulated a vertical wellbore located at the midpoints of the well elements.

Unconventional well completions are for multilateral, multifractured horizontal and radial fractured wells. Multilateral wells fall into two categories: the main wellbore type for reaching multiple production zones and the fishbone type for reaching different regions in the same production zone.

This screening study uses flow simulation tools to investigate the optimal number of laterals of a vertical well and, accordingly, each lateral production.

Study well performance investigates:

- A well with lateral arrangements
- Partly reservoir heterogeneity
- Various fluids
- Wellbore friction
- Water influx

The optimal number of laterals in a simple box reservoir is three laterals. In the study, we tested the production of a vertical well with one, three, and six laterals.

Further, our study provides the following results:

- Optimum number of wells due to drainage interference
- Heterogeneity increases oil production
- Viscosity decreases oil production
- Water influx increases well productivity

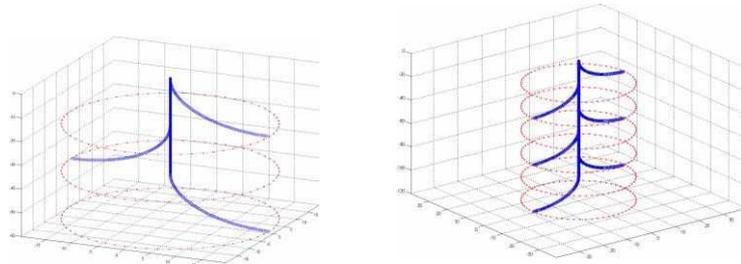
In addition, the study explores Wellbore friction. The following are the study Concluding Remarks:

- Production slightly varies when laterals are both perforated and of a multisegmented well, MSW
- Hole-MSW open output is higher compared to perforated laterals
- There is a negligible difference in pressure drop between laterals (analytical model developed model)

Drilling open hole sidetracks on any oil field may be cost-efficient for establishing multilateral wells for maximum drainage, thus facilitating this screening flow simulation.

Future real-flow simulation studies will include:

Subsea horizontal three-lateral well, a real case study of multilateral well production Include G&G reservoir heterogeneity. It will consist of fluid characterization of gas condensate. It will include the full range of SCAL data, i.e., Relative permeability, capillary pressure curves, and water and gas oil contacts with transition zones. It will also include the modelling of the water influx. The study will present the benefits of risk analysis and economy.



References

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