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The critical parameters of a horizontal well influenced by a barrier in a bottom water reservoir

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It is well-known that barriers have a significant impact on the production performance of horizontal wells developed in a bottom water drive reservoir. Since MUSKAT and WYCKOFF introduced the water coning phenomenon and theory to petroleum engineering, horizontal well's critical rate calculations, water breakthrough time predictions and water cut reductions have been investigated. The methods reported in literature for controlling water cut include perforating far away from the original water-oil contact (WOC), producing oil below the critical rate, producing oil and water separately with Downhole Water Sink (DWS) or Downhole Water Loop (DWL) technology and injecting polymers to form a barrier. Barrier impacts on water cut and critical rate of horizontal well in bottom water reservoir have been recognized but not investigated quantitatively. Considering the existence of barriers in formations, this presentation will introduce our research about horizontal well flow model with barriers when the water cresting forms in bottom water reservoir. The research result shows that barrier increases critical rate and delays water breakthrough. Further study the barrier size, location and permeability shows that the increases of barrier size and barrier height led to the higher critical rate. But the incremental rate more and more litter. For a given barrier size and position, the critical rate and critical potential difference monotonically decrease as the barrier permeability increases. The case study shows the method presented here can be used to predict the critical rate in the bottom water reservoir and applied to investigate the horizontal well behavior of water cresting.

Biography

Yue Ping has completed his PhD from Southwest Petroleum University. He is the Associate Professor of SWPU. He has engaged in oil and gas reservoir development theory, method and technology research. His research interests include horizontal and multi-branched well-bore flow and reservoir seepage coupled model.

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