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CO_2 and viscosity breaker assisted steam huff and puff technology for horizontal wells in a super-heavy oil reservoir

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Abstract

In order to improve the recovery effect of steam huff and puff in a super-heavy oil reservoir, the displacement efficiency of CO_2 and viscosity breaker assisted steam flooding was studied through in-lab displacement experiments. The viscosity reduction mechanism of CO_2 and viscosity breaker assisted steam huff and puff for horizontal well was realized by numerical simulation. The results show that the displacement efficiency of CO_2 and viscosity breaker assisted steam flooding (80.8%) is higher than that of steam flooding (65.4%). The CO_2 and viscosity breaker assisted steam huff and puff technology for horizontal well realizes the rolling replacement of synergistic viscosity reduction of viscosity breaker, CO_2 and steam, thus effectively reducing the steam injection pressure, expanding the steam swept area, i.e., expanding the viscosity reduction region, and improving oil production rate. It could be divided into four compound viscosity reduction areas with the difference of temperature distribution and viscosity reduction mechanism. They are steam compound viscosity reduction region, hot water compound viscosity reduction region, low temperature water compound viscosity reduction region and CO_2-viscosity breaker compound viscosity reduction region. Field tests show that the CO_2 and viscosity breaker assisted steam huff and puff technology for horizontal well is good at reducing viscosity and improving production of super-heavy oil reservoirs with deep and thin layers, deep and heavy layers, shallow and thin layers.

Biography

Li Zhaomin has completed his PhD from China University of Petroleum of Oil and Gas Well Engineering. He is a professor and the Vice President of China University of Petroleum (East China), Chairman of Foam Fluid Research Center of CUP, Director of China Oilfield Services Limited–China University of Petroleum (COSL-CUP) Joint Laboratory on Foam Fluid Technology, technological committee member of SPE APPLIED TECHNOLOGY WORKSHOP (ATW,2012XIAN). He has published 100 academic papers and 3 monographs, and he has been nominated for ENI AWARD 2013 for his efforts in energy and environment research.