Contribution ID: **334** Type: **Poster Presentation**

A Novel Analysis Method for Water Breakthrough Mechanism in an Offshore Heavy Oil Reservoir with Bottom Water

Wednesday, 1 June 2022 14:50 (1h 10m)

A nitrogen-assisted steam stimulation test (NSST) was firstly carried out to evaluate potential for improving recovery of CN Reservoir, a typical heavy oil reservoir with high formation oil viscosity (447~577mPa•s) and strong bottom water drives. Unexpectedly premature water breakthrough and rapid water rising, however, occurred in a surrounding general production (SGP) well at early stage of first steam huff process. Reservoir characteristic with strong bottom water drives makes it difficult to diagnose this kind of phenomenon.
Through comprehensive analysis on the curves of water-oil ratio and water-oil ratio derivative, current change in current cards from electric submersible pump and formation water assay data, it was confirmed that the additional water produced of SGP well came from injected steam of NSST well, not bottom water coning. Improved Hall curve slope (IHCS) was derived, which can real-time reflect injection resistance change during injection process of NSST well. IHCS curve was divided into three sections with different values, indicating the resistance effect decreased stepwise. Each segment had distinct characteristics, and it was suggested that slippage effect of heated nitrogen caused the rapid gas breakthrough at the stage of initial injection, and the formation of gas channeling induced the following water breakthrough. The analysis on the water breakthrough mechanism was consistent with real-time monitoring results.
This paper details how to analyze breakthrough mechanism using IHCS curve method, which can also be used to evaluate the injection effect efficiently in other steam stimulation tests because of its real-time diagnostic feature.

Acceptance of the Terms & Conditions

Click here to agree

MDPI Energies Student Poster Award

Yes, I would like to submit this presentation into the student poster award.

Country

China

References

Time Block Preference

Time Block C (18:00-21:00 CET)

Participation

Online

Primary author: PAN, Guangming

Co-authors: KANG, Kai; HUANG, Jianting; QU, Jifeng; SHI, PENG

Presenter: PAN, Guangming

Session Classification: Poster

Track Classification: (MS06-B) Interfacial phenomena in multiphase systems