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Integrated Workflow of Fracturing-Flowback-Production in Tight Oil Reservoirs with a Focus on Fracturing Fluid Leak-off.

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Hydraulic fracturing in tight oil reservoirs requires injecting large volumes of fracturing fluid into the formation while only a small proportion of fracturing fluid can flow back during the production phase. The retained fracturing fluid will affect subsequent production. We implement an integrated workflow which simulates fracture propagation through a full 3D simulator and seamlessly docks to an efficient reservoir numerical simulator, then we simulate the injection phase and subsequent production phase using dilation/compaction curves based on fracturing pump injection data and actual production data. The workflow has been successfully applied to a field case in the Daqing Oilfield, China. Our simulations effectively match the oil and water production data and prove our hypothesis that numerous microscale fractures are generated during hydraulic fracturing which cause significant leak-off of the fracturing fluid. The closure of microscale fractures during production phase results in the retention of the fracturing fluid and stable water cut after several months of production.

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References

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