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Optimization Method Research of Multi-stage Polymer Flooding

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Polymer flooding is an effective way to enhance the recovery rate of heavy oil reservoirs in high water-cut stage. To overcome the commonly existing defects of general polymer injection such as high costs and high transmissibility pathways. Multi-stage concentration polymer flooding and optimization methods are researched to clear out its influence on heterogeneous reservoir recovery enhancement. Different polymer injection experiments are performed on heterogeneous cores to study the polymer flooding injection order, permeability ratio, oil-water viscosity ratio on the influence of recovery. Numerical simulation experiments are also carried out on different heterogeneous models to research the influencing factors of polymer flooding to probe into the mechanism of polymer flooding enhancing oil recovery.

Results show that permeability ratio is an important factor affecting polymer flooding recovery. In low permeability ratio situations, the displacement effect is well, and as the permeability ratio increases the EOR effect goes down. Two stage concentration slug polymer flooding is better than single slug and three stage slug injecting in low and middle permeability ratio formations. Three stage concentration slug polymer flooding demonstrate a good EOR effect on high permeability ratio formations. When the oil viscosity and permeability ratio is low, three stage polymer flooding effect is better than that of two stage polymer flooding, and as oil viscosity and permeability ratio increases, two stage polymer flooding exceeds the three stage flooding modes. Numerical simulation results show that the three stage concentration slug polymer flooding is better than single stage and two stage, which is accordance with the experimental rules.

Keywords: polymer flooding, multi-stage concentration slug, permeability ratio, viscosity, EOR

References

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