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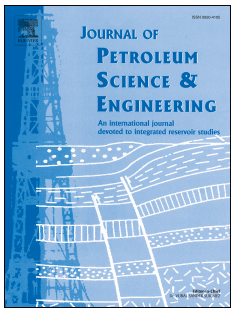

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Simulation of counter-current imbibition in single matrix and field scale using Radical integral boundary element method

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Abstract: During the water driving process in reservoir which has complex fracture networks, water flows in the fractures and matrix blocks are surrounded by fractures, under this circumstance, spontaneous counter-current imbibition is the dominant mechanism for oil recovery. Therefore, modeling the counter-current behavior properly is such essential when evaluate the production performance of fractured reservoir that contains large amount of water. In this paper, the Radical Integral Boundary Element Method（RIBEM）is firstly introduced to simulate spontaneous counter-current imbibition process，this method successfully transforms the governing equation of counter-current imbibition into the complete boundary integral form and thus the boundary element method can be applied to calculate counter-current imbibition rate, the core advantage of this method is that RIBEM can achieve acceptable results without the need to divid the matrix block into many subgrids, which is convinient for application and reducing a lot computational burden.The validation of RIBEM is tested both on core and field scale, simulated results are in good agreement with corresponding experiment and fine grid simulation data.

Keywords: counter-current imbibition; radical boundary element method; dual-porosity model