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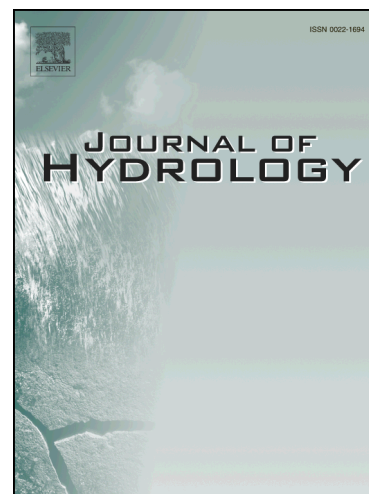
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Effects of delayed particle detachment on injectivity decline due to fines migration

Thomas Russell, Kiet Wong, Abbas Zeinijahromi, Pavel Bedrikovetsky

*Australian School of Petroleum, University of Adelaide, Australia***Abstract**

Colloidal-suspension flows in porous media occur in numerous areas of environmental, chemical and petroleum engineering. The main processes are capture and detachment of particles, yielding permeability decline. We developed a governing system of transport equations with particle detachment kinetics, where the detachment by high velocities is instant, due to flow incompressibility, and the detachment by decreasing the fluid salinity is delayed, due to micro-scale diffusion. The system allows for a semi-analytical solution for axi-symmetric low-salinity water injection with fines migration. The model exhibits instant fines mobilization at the beginning of injection by drag force, fines release with delay behind the salinity front by electrostatic force, and the interaction of two concentration waves. The model can be used for laboratory-based injectivity decline prediction during injection of water in aquifers and oilfields, where the injected and formation water compositions are different, and also for fines-migration during drilling fluid invasion.

Keywords

Fines Migration; Formation Damage; Injectivity Decline; Low-Salinity Waterflooding; Analytical Modelling; Axi-symmetric flow

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