

## Two-Phase Flow Modelling and Numerical Simulation for Waterflooding in Enhanced Oil Recovery

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**Abstract :** The waterflooding process is an enhanced oil recovery (EOR) method that appears tremendously successful. This paper shows the importance of the role of the numerical modelling of waterflooding and how to provide a better description of the fluid flow during this process. The mathematical model is based on the mass conservation equations for the oil and water phases. Rock compressibility and capillary pressure equations are coupled to the mathematical model. For discretizing and linearizing the partial differential equations, we used the Finite Volume technique and the Newton-Raphson method, respectively. The results of three scenarios for waterflooding in porous media are shown. The first scenario was estimating the water saturation in the media without rock compressibility and without capillary pressure. The second scenario was estimating the front of the water considering the rock compressibility and capillary pressure. The third case is to compare different fronts of water saturation for three fluids viscosity ratios without and with rock compressibility and without and with capillary pressure. Results of the simulation indicate that the rock compressibility and the capillary pressure produce changes in the pressure profile and saturation profile during the displacement of the oil for the water.

**Keywords :** capillary pressure, numerical simulation, rock compressibility, two-phase flow

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