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## A novel method to characterize reservoir properties' time-variation in polymer-flooding reservoir: Simulator development and case studies

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The present study characterized polymer-flooding reservoirs properties' time-variation in laboratory experiments and numerical simulation. Firstly, injection pore surface flux (IPSF), defined as the ratio of fluid flux to grid pore area, is used to describe the time-variable properties. Laboratory experiments are conducted to determine the relationship between reservoir properties and IPSF from the core flooding. Based on the conventional polymer flood model, a new numerical simulator considering continuous change of absolute permeability/relative permeability with IPVM is developed, and is verified by comparing with CMG. Then, the influences of time-variable properties on recovery are examined. Finally, this simulator is applied to the largest polymer-flooding reservoirs in Bohai Bay, to demonstrate how this simulator can achieve more accurate simulation. Reservoir simulation considering time-variation mechanism is more accurate in polymer flooding reservoir characterization and understanding of fluid flow in high water cut reservoirs. In addition, different from previous authors who employed the ratio of fluid flux to grid pore area for characterization, the proposed method uses IPSF to describe the variation of reservoir properties in order to overcome the dependency on grid sizes, thus the simulation would be more reasonable.