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Prediction of geomechanic parameters of reservoir rock to improved production operation using well log data and empirical relations in order to enhance polymer flooding in a reservoir in iran

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Introduction. During the drilling operation, well and formation around wellbore may encounter some problems and damage types. Formation damage is one of the main problems of wellbore resulted in extensive permeability reduction in the area.

Aim. Formation damage can further affect well performance and its productivity index during production period. In this conditions, improved oil recovery (IOR) methods could be applied. For this purpose, knowing and evaluating the features of reservoir rock is essential. This recognition can be directly obtained by providing core samples from the well and performing tests on them.

Materials and methods. Experimental methods are often expensive and time-consuming, thus the geomechanical parameters of rock can be evaluated using empirical relationships as an alternative technique. In recent years, many researchers have been presented some empirical correlations based on well log and experimental data in order to estimate the geomechanical parameters of rocks. As empirical correlations have been obtained based on different well log data, thus they cannot result in desired outcomes in all wells. Therefore, all the empirical relations should be evaluated in order to determine their efficiencies. In this paper, one of Iranian south oil well with serious permeability reduction issue has been investigated in order to determine its geomechanical parameters for performing an IOR scenario. These parameters were estimated using optimized empirical relationships, which have been evaluated by well log data, leak off test and hydrostatic experiment. The behavior of reservoir rock could be determined using these relationships in any desired conditions.

Results. The results show that Jambunathan relation is the best one to measure the elastic module because of the best match with the hydrostatic experiment data. The pore pressure obtained from Eaton correlation indicates the same outcome of the well sonic log. Conclusion. Poroelastic relations have been resulted in reasonable outcomes for maximum and minimum horizontal stresses based on leak off test.