Abstract

Water Alternating CO_2 injection (WAG CO_2) is one of the most promising EOR techniques for further recovery improvement. A successful implementation of this method depends mainly on its optimal design parameters, which are determined using a significant number of routinely numerical simulations. However, these latter are very time-consuming and their analysis can put a considerable strain on the flexibility of application. The aim of this study is to develop a new method to optimize WAG processes in presence of multiple conflicting criteria and time-depending constraints. To this end, a hybrid model based on multilayer perceptron(MLP), which was used as a replica of the simulator in mimicking the outputs, and Non-Dominated Sorting Genetic Algorithm version II (NSGA-II) was applied. Three different MLP models were built by implementing LMA, BR and SCG algorithms during the MLP training phase. The results showed that MLP-LMA model is the most accurate proxy. In addition, the proposed MLP-LMA emulates the outputs in real-time (dynamic proxy) with a high accuracy and a tiny running-time. The hybridization NSGA II-proxy ensures the approximation of the Pareto front to the formulated WAG problem. The generated Pareto front provided many WAG scenarios yielding to practical decision-making capabilities. The findings of this review can help for better understanding and studying multi-objective based WAG optimization problems in presence of time-depending constraints.