Evolving Genetic Algorithm, Fuzzy Logic and Kalman Filter for Prediction of Asphaltene Precipitation due to Natural Depletion

Abstract

The purpose of this paper is to illustrate how Fuzzy Decision Tree (FDT), which is an automatic method of generating fuzzy rules, can predict the flow rate, as a vital parameter in order to design the necessary wellhead production facilities, of an under saturated Iranian petroleum reservoir. Because of the special thermo dynamical conditions of the supposed
reservoir, two very important variables consist of Temperature and Pressure, were selected as input factors. In order to develop the model of FDT, firstly, 1600 series of data were gathered and divided to two main parts which 1100 of them were utilized to build the model and the rest of them to test it. As the FDT method is strongly based on applying widely and effectively the concept of ambiguity and furthermore, to do this project more accurately and less dependent on experts' knowledge, it was decided to gain from piecewise linear membership functions (MFs) whose parameters have automatically been dedicated through calculating a very special method of possibility density function (pdf). When the process of developing the FDT was finished, there were five rules available to measure the rate of compatibility and flexibility of the model by applying the rules on testing set. The model result, 0.898 of R-square for testing set, shows that the FDT yields an acceptable result compared to other methods either practical or theoretical. In conclusion, according to the calculated result, it is possible to exploit this method for flow rate prediction field wide.

References

- Malik Shahzad Kaleem Awan, Mian Muhammad Awais. Predicting weather events using

**Index Terms**

Computer Science

Artificial Intelligence
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