Artificial neural network simulation and sensitivity analysis of heavy oil cracking unit

Abstract:

This paper presents an artificial neural network (ANN) model of heavy oil catalytic cracking (HOC). The main feature of the model isto provide general and accurate and fast responding model for analysis of HOC unit. In this study, American petroleum institute index(API) , weight percentage of sulfur, Conradson carbon residue content (CCR), gas, coke, and liquid volume percent conversion (%LV)of reaction were considered as network inputs while the percentage of normal butane (N-C4), iso-butane (I-C4), butene (C4=), propane(C3), propene (C3=), heavy cycle oil (HCO), and light cycle oil (LCO) and gasoline (GASO) were considered as network outputs. 70%of all industrial collected data set were utilized to train and find the best neural network. Among the different networks, feed-forwardmulti-layer perceptron network with Levenberg Marquardt (LM) training algorithm with 10 neurons in hidden layer was found as thebest network. The trained network showed good capability in anticipating the results of the unseen data (30% of the all data) of catalytic cracking unit with high accuracy. The obtained model can be used in optimization and process planning.