

Model simplification for an industrial naphtha cracking furnace using stochastic approach

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The simulation and optimization of naphtha cracking furnaces in NCC(Naphtha Cracking Center) have attracted attention of many plant engineers and researchers because the furnace determines the ethylene yield and it affects the total profit. In order to predict the furnace operating condition when solving those problems, a furnace model is required. Although there have been some commercial furnace simulators, they have been used only as yield predictors. They simulate the furnace operating condition by solving a rigorous mathematical model. Because they include thousands of reactions to simulate the complex naphtha cracking reactions, they require high computational load. In order to solve the optimization problem of furnace operation, the furnace model should be simplified. In this study, we simplified the furnace model using the stochastic approach, neural network. This model is trained and validated using simulation and operating data. The outputs of the simplified model are compared with those of CRACKER and real operation.