Industrial & Engineering Chemistry Research (2008), 47, 9018-9024

Modeling and Simulation of a Downer-Type HS-FCC Unit

Shaikh, A. A.; Al-Mutairi, E. M.; Ino, T.
Department of Chemical Engineering, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia

Mathematical models and simulations of an integrated downer−regenerator FCC unit are presented. The models describe the steady-state nonisothermal behavior of the interdependent heavy oil cracking downflow reactor and catalyst regeneration fluidized-bed reactor. The models are rooted in four-lump cracking reaction kinetics and complete combustion kinetics for the regenerator reactions. Simulations results for the downer-type unit are partially validated against data collected in a 0.1−0.3 b/day pilot plant that was operated in the *high-severity* mode. The results are fairly reasonable especially in regard to predicting the performance of the cracking reactor.