COMPLEX REACTIONS IN AN FCC RISER REACTOR

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Computational fluid-dynamic (CFD) is a useful tool to understand the performance and help the design of fluidised catalytic process (FCC) riser. In addition, to characterise the hydrodinamic effects on selectivity and conversion, the cracking kinetics need to be coupled with the hydrodynamics. Experiments are highly desired but they are costly and time consuming, especially, for process equipment at the industrial scale; conversely, computer simulations are usually inexpensive and rapid to conduct. Neverheless, modelling the catalytic cracking of heavy oils is not an easy task, since it involves a very large number of components and reactions. The lumping kinetic approach is often implemented in CFD calculations to simulate the FCC process, however, this approach presents limitations especially in relation to an accurate kinetic description of each lump. This work studies the influence of the kinetics of the reactions on the simulation of an FCC industrial riser. The study aims to give details on the yields of cracking products when coupled with the FCC fluid dynamics; hence, the results obtained are compared with experimental kinetic data from the literature. Our preliminary results show that the technique appropriately describe the experiments and it can be used as an powerful method to implement the kinetics of any complex petroleum reaction mixture in CFD.