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PROJECT REPORT

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"DYNAMIC MODELING AND SYMULATION OF FIXED BED CATALYTIC REACTOR"

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ABSTRACT

The fixed bed catalytic reactor is defined as the one in which reactant fluid contacts with solid catalysts arranged in fixed bed. It generally experience temperature peaks known as 'hot spots" with exothermic reactions. The magnitude of the "hot spot" depends on the heat effect of the reaction, Heat transfer coefficient and Area available for the transfer of heat etc. To understand the temperature profile (Hotspot) within the reactor and its sensitivity to other process variables like Inlet feed concentration and coolant flow rate it is essential to develop a Mathematical model.

The present work deals with development of one dimensional pseudo homogeneous model. The reaction system chosen for the study is the oxidation of O-xylene to Pthalic Anhydride on v_2o_5 catalyst reported by G.F.Froment (1979). First, The steady state behavior is observed by solving the set ordinary differential equations and to get the dynamic behavior of the packed bed catalytic reactor a set of partial differential equation is solved using central finite difference method. All the simulation studies are carried out in MAT LAB package. In the proposed study the effect of inlet feed concentration and coolant flow rate on the temperature profile within the reactor is analyzed.