REACTOR PARAMETERS DESIGN OPTIMIZATION FOR SYSTEMS OF REACTORS BY USING FIRST ORDER KINETICS

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ABSTRACT

Problems of reactor optimization are expressively more complex than other kind of equipment because of the non-linear behavior of the reactors system. Frequently reaction rates expressions are non-linear equations. In the present paper a procedure was developed to optimize the parameters design to several types of reactors with first order kinetics reactions. The chosen variables to be optimized are conversion and recycle ratio, depending of the reactor type. A computational program was developed in FORTRAN language. The routine optimization uses the half interval method. To this method it was incorporated a gradient analyze of the middle point to improve its convergence. The objective function developed is based in costs with raw material and reactors construction, such as in the final product price. The constraints are derived of the reactors design equations, mass balances and the material amount used in the reactors manufacturing. The mathematical formulation of the problem doesn't presents inequality constrains. Besides, all of the constrains were incorporated in the objective function. In his way, the problem became unconstrained. Even for first order kinetics, the problem remains non-linear. The developed program allows user to find the parameters optimal values with low computational time. Some examples from the literature were used to test the program viability, and the results shown to be coherent with literature.