Modelling, Simulation & Optimization of Lactic Production Processes".

Asma AL Harthi

Abstract

This study presents the use of differential evolution algorithm for single and multi-objective optimization of the fermentation production processes for Lactic Acid. Differential evolution (DE) algorithm is used in validating the kinetic models, estimating the kinetic parameters and obtaining the optimal control of batch and two stages with cell recycle fermentations processes. Improved kinetic constants for the fermentation processes are found by minimizing the least square error between the experimental data and the results of the simulated model. DE successfully improves the optimization results of batch fermentation bioreactor. DE strategies comparative analysis is studied to check the robustness of the optimization algorithm. The DE/best/1 is the best strategies suitable for such problems. Two multi-objective differential evolution algorithms; I- MODE and NSGA-ll are used to obtain the optimal variables for two stages with cell recycle fermentations processes. Three conflicting objectives (overall lactic acid productivity, Pr the overall glucose conversion, xs and the reactor yield, $Y_{p/s}$) are used.