Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **19 (2012)** 697-707

AN IMPROVED NONLINEAR COMPLEX SYSTEM OF MICROBIAL BIOCONVERSION PROCESS IN FED-BATCH CULTURE

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Abstract. The purpose of this paper is to explore the properties of a new model which can describe the multistage of population growth of microorganisms. The improved model is developed based on the time dependent changes of the specific growth rate. Considering the discontinuity of the process of adding glycerol and alkali, a nonlinear complex kinetic system(CKS) of fed-batch fermentation is investigated. Then the existence, uniqueness and boundedness of solutions to the CKS and the Lipschitz continuity and differentiability of solutions with respect to the initial-state-control pairs are discussed. Finally, a numerical example is employed to carry out numerical simulation for the CKS.

Keywords. Fed-batch culture, Bioconversion, Nonlinear complex kinetic system.

AMS (MOS) subject classification: 37N25, 92B05.

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Received Noveber 2008; revised September 2012.

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