

Bifurcation and stability analysis of a two step model for monitoring anaerobic digestion processes

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Abstract :

This paper deals with the equilibria and stability analysis of the two step anaerobic model initially proposed by [12] to describe the dynamical behavior of an anaerobic fixed-bed wastewater treatment process. In a first part, the model is analyzed: its equilibria and their stability are established considering qualitative properties of the kinetics. In a second part, it is shown that the overloading tolerance (denoted herein OT), a parameter proposed in [9] to monitor anaerobic processes on-line, may not be suitable for monitoring the system and even causes serious problems under certain functioning conditions. Based on the analysis results established in the first part, a modified OT is proposed and evaluated in simulation.

Keywords : Anaerobic digestion; Biotechnology; Steady state analysis; Equilibrium; Model approximation; Risk analysis.

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