MARION WEEDERMANN, Dominican University

Optimization of biogas production in a model for anaerobic digestion

We investigate a model for anaerobic digestion, a process used to produce biogas. The model describes the interactions of microbial populations involved in three main stages of anaerobic digestion: acidogenesis, acetogenesis, and methanogenesis. We show that an increased yield in biogas was achieved in regions where operating parameters pushed the system into a bistable state. In some regions of bistability, biogas production occurred at only one of the steady states while in others both steady-states resulted in biogas production with one state being more productive than the other. We demonstrate which operating parameters and state variables had the most significant impact on system performance. Surprisingly, the optimal biogas production did not always occur at a steady state where all classes of microorganisms coexist. This is joint work with Gail Wolkowicz.