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*A simplified model of anaerobic digestion*

Anaerobic digestion is a complex biologically mediated process which is used in the treatment of waste and wastewater to produce biogas and other bio-fuels. The Anaerobic Digestion Model No. 1 (ADM1) is the industry standard for modelling the anaerobic digestion process, and comprises of 32 state variables when implemented as a system of differential equations. We analyze a simplified model proposed by Bornhöft, Hanke-Rauschenback, and Sundmacher, that seems to capture the qualitative dynamics of ADM1. We show that their model simplifies further to a chemostat with non-monotone response. Using a novel Lyapunov function argument, we show there are no periodic orbits in the full system, an every solution converges to an equilibrium point. The absence of periodic orbits is a new result for single species growth in the chemostat with non-monotone response.