

438m Static and Dynamic Characteristics of Commensalistic Cultures with Kinetic Feedback

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Steady state and dynamic behavior of mixed cultures with one way interaction is investigated. The substrate (resource) required for the growth of the host species is generated by extracellular products of the growth, providing thereby a kinetic feedback. The steady states are divided into three types. For the form of kinetics considered, the reactor can operate at up to seven steady states. Criteria for admissibility and stability of different steady states are derived analytically. Admissibility of cyclic states is investigated. The specific example considered pertains to anaerobic digestion of insoluble organics by acid generating and methane generating bacteria. For specific kinetic parameter set, the operating parameter space is divided into multiple regions based on admissibility of various steady states and dynamic characteristics. Start-up policies to reach desired steady states are discussed.