BA/SA/MA – Competing Bacteria Populations in Bioreactors

1 Background

Population systems with competing species are found in many application examples, such as bioreactors for protein synthesis or wastewater treatment plants. Besides the analysis of the populations' behavior, controlling the system is relevant to increase the efficiency, which can be interpreted as the yield of proteins or the consumption of undesirable substances in the wastewater.



As the organisms are not homogeneous, these population systems are best described by *partial differential equations (PDEs)* in dependence of the bacteria's age. The special focus of the current project phase is the investigation of two populations competing for a single food source. The first step to design feedback control algorithms is a system analysis and linearization.

2 Tasks

- Linearization of the coupled PDEs
- Analyzing the influence of different system inputs
- Simulation of the linearized system
- (Design of first control approaches)

3 Requirements

- Lecture "Distributed Parameter Systems" (DVPS) could be helpful
- Mathematical understanding
- Latex skills and clean notation style

Contact

Carina Veil Room 1.38 Carina.Veil@isys.uni-stuttgart.de