

Analysis of a Finite–Volume Scheme for a Single– Species Biofilm Model

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Biofilms are accumulations of microorganisms that can be found on almost every surface, for instance as dental plaque on teeth or as an accumulation of *Staphylococcus Aureus* on catheters. Based on the biofilm growth model formulated by Eberl, Parker and van Loosdrecht in 2000, we formulate an implicit Euler finite–volume scheme for the degenerate–singular diffusion equation for the biomass fraction, which is coupled with a diffusion equation for the nutrient concentration. The major challenge is the preservation of the upper bound of the biomass fraction due to the degenerate–singular diffusion equation. Our main results are the existence and uniqueness of a discrete solution and the convergence of the scheme, where the bounds of the biomass fraction and the nutrient concentration are preserved.

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