

Abstract Submitted  
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**Numerical simulation on the assimilation of substrate by microorganisms in a turbulent flow** MARION LINKES, PASCAL FEDE, IMFT, JEROME MORCHAIN, PHILIPPE SCHMITZ, LISBP — A strong decrease in the conversion yield of substrate into biomass is constantly observed in fed-batch bioreactors when passing from a laboratory to an industrial scale because of concentration gradients that influence the biomass behaviour. In this work, the focus was emphasised on the effect of the mixing on the microorganisms. This was addressed through a one-dimensional diffusion model for the transport of substrate towards the cell with specific boundary conditions at the microorganism, that plans to simulate its limiting behaviour. Diversified far field concentrations in substrate were investigated and aimed to mimic the several states of mixing at the small scale of the flow. The influence of relevant parameters of the entering substrate concentration was scrutinized in term of interfacial response at the cell interface. This interfacial response takes into account the concentration and assimilation rate at the microorganism interface, and its analysis shows results in good agreement with different experimental observations and the cell affinity for the substrate has been determined taking the mixing state of the latter.

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