Upscaling enzymatic hydrolysis of lignocellulosic biomass

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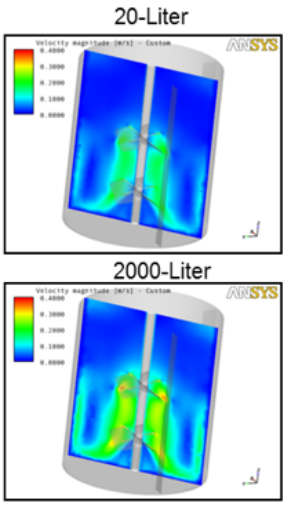
Description

Enzymatic hydrolysis of lignocellulosic biomass is a crucial step for the fermentative conversion of renewable feedstocks into valuable chemicals, with great impact on the techno-economic efficiency of biorefineries. Currently, achieving rapid and efficient hydrolysis is still challenging, mostly due to mass transfer limitations caused by feedstock rheology and reactor flow regime.

To effectively optimize and upscale enzymatic hydrolysis, it is crucial to understand the rheology of the pre-treated biomass slurry during hydrolysis, and to determine the ideal degree of mixing in order to optimize sugar yields, while reducing the extent of shear-induced enzyme deactivation and mixing power input. Testing enzymatic hydrolysis at pilot-scale is critical for industry, however it is also very costly.



To minimize the costs of upscaling enzymatic hydrolysis, we want to develop a cost-efficient method making use of a scale-down approach and CFD modelling studies. By understanding the hydrodynamics and reaction conditions at pilot-scale, it should be possible to mimic large-scale transport conditions in a lab-scale set-up. As a result, lab-scale can be further used for effective process optimization, significantly decreasing process development costs.