Karlsruhe Institute of Technology

Diplomarbeit / Masters Project

Project Summary:	**Computational Fluid Dynamics Approach to Determine Membrane Module Performance with Fluctuating Energy** Decentralised membrane treatment in areas without water and energy infrastructure invites the use of small membrane systems. To make such systems robust in harsh environments there is a preference to apply renewable energy (photovoltaics; wind) without storage device (batteries). This direct coupling of variable energy with water treatment results in pressure and flow variations. Such variations determine the hydrodynamic conditions that affect the performance of the modules (retention; fouling) significantly. The aim of this project is to develop/adapt a CFD model to describe the hydrodynamic conditions in two commercial module sizes. The model will then be used to explain experimental results obtained with real water experiments using a solar powered nanofiltration/reverse osmosis system in Tanzania. The following tasks will be performed; • Literature review on the topic (CFD; spiral wound membrane modules; energy fluctuation; hydrodynamics) • Set-up of a CFD model for spiral wound membrane modules of different commercial sizes and membrane characteristics (permeability) • Correlate the CFD model with experimental membrane filtration results of two different module sizes with real waters The topic is embedded in a 1-2 year research project that has been carried out in Tanzania using solar powered nanofiltration. Experimental results are available.
Required Skills:	**Studies in Chemical/Process Engineering or equivalent (Uni, TH)** Basic knowledge in CFD or other simulation techniques Willingness to lead or contribute to the writing of a scientific publication.
Institute/ Department:	Institute for Mechanical Process Engineering Institute for Functional Interfaces (IFG) / Membrane Technology
Start Date:	Anytime / To be discussed
Project Supervisors:	Prof. Dr.-Ing. Hermann Nirschl, +49(0)721/608-42404, hermann.nirschl@kit.edu; https://www.mvm.kit.edu Process for Mechanical Process Engineering Prof. Dr.-Ing. Andrea Schäfer, +49(0)721/608-26906, Andrea.Iris.Schaefer@kit.edu; https://www.ifg.kit.edu/english/3803.php Professor of Water Process Engineering, Faculty of Chemical and Process Engineering