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Water Supply and Wastewater Treatment

MODELLING AND SIMULATION FOR THE PREDICTION OF ULTRAFILTRATION PROCESS PERFORMANCES IN WASTEWATER TREATMENT

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Abstract

Mathematical modelling represents a key tool in designing or scaling-up ultrafiltration processes and installations with high technical and economical efficiencies due to the complexity of the phenomena underlying the membrane separation processes. Modelling of the ultrafiltration processes is usually difficult because of these phenomena that occur during the separation and membrane cleaning cycles and the complex interactions between the membrane and the wastewater pollutants. Based on a set of consistent experimental data realized on two membranes operated in dead-end mode, this paper presents the use of the *resistances-in-series model* for the prediction and simulation of flux decline in different process conditions, considering the cycles of ultrafiltration and backwashing. As a result of the model improvement, very good correlations were obtained for short tests (for both membranes) and long tests (only for one membrane) operated at pressures ranging from 0.2 to 0.5 bar. These correlations have permitted to simulate the behavior of the membranes in different process conditions (e.g. at higher pressures), providing information on the optimal parameters needed to improve the ultrafiltration system performances.

Keywords: wastewater, ultrafiltration, mathematical modeling, simulation

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