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Prediction of membrane fouling in the pilot-scale microfiltration system using genetic programming

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Abstract

In the recent past, machine learning (ML) techniques such as artificial neural networks (ANN) or genetic algorithm (GA) have been increasingly used to model membrane fouling and performance. In the present study, we select genetic programming (GP) for modeling and prediction of the membrane fouling rate in a pilot-scale drinking water production system. The model used input parameters for operating conditions (flow rate and filtration time) and feed water quality (turbidity, temperature, algae pH). GP was applied to discover the mathematical function for the pattern of the membrane fouling rate. The GP model allows predicting satisfactorily the filtration performances of the pilot plant obtained for different water quality and changing operating conditions. A valuable benefit of GP modeling was that the models did not require underlying descriptions of the physical processes. GP has displayed the potential to evaluate membrane performance as a feed-forward simulator toward an "intelligent" membrane system.

Keywords: Genetic programming; Membrane fouling; Prediction

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