Analysis of a transmembrane pressure (TMP) jump prediction model for preventing TMP jumps

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ABSTRACT

In water treatment process such as membrane bioreactors (MBRs), transmembrane pressure (TMP) must be monitored for process control when the process is operated under a condition of constant-rate filtration. One of the reasons making it difficult to monitor, predict, and control TMP is TMP jumps, which means that TMP rise-up rapidly even under the critical flux. We previously constructed a statistical model that predicts the time of a TMP jump by inputting elapsed time, flux, TMP, and other MBR parameters such as operating conditions and water quality. This model is called a TMP jump prediction model. The predictive ability of the TMP jump prediction model was demonstrated through many data sets obtained from real MBRs. In this study, we analyzed the TMP jump prediction model to search optimal operating conditions that can prevent TMP jumps. By changing the values of operating conditions and predicting the time of TMP jumps for each candidate of operating conditions, we could control the time of a TMP jump in a full-scale MBR.

Keywords: Membrane bioreactor; Fouling; Transmembrane pressure jump; Prediction; Control

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