

Reduction of Membrane Fouling in Membrane Bioreactor using an Iterative Dynamic Programming based Control System

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Membrane fouling is a problem that restricts performance of membrane bioreactor (MBR) process as accumulated with particle matters on membrane. The objective of this study is to search a trajectory of optimal permeate flux of the MBR process, since a reduction of permeate flux reduces the membrane fouling progress, however, it affects capital cost through membrane area demand for satisfying permeate production. To consider a periodic variation of membrane fouling, which increases during suction period and decreases during physical/chemical cleaning period, an iterative dynamic programming (IDP) is used. IDP is a powerful technique that searches the optimal control policy by separating whole control duration into several time stages. As a result, the MBR process with the IDP-based optimal permeate flux trajectory shows less progress of membrane fouling and much production of permeate as compared to the MBR process operated with the fixed permeate flux.

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