EFFECT OF 3D PRINTED TURBULENCE PROMOTER ON FOULING

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ABSTRACT

In recent years, membrane processes have become important tools in water and wastewater treatment because they have several advantages over traditional separation systems. Membrane fouling is still a serious problem in microfiltration and ultrafiltration, limiting the potential of this technique. A promising alternative for improving the hydrodynamic conditions of membrane separation processes is the application of turbulence promoters. These devices reduce particle deposition by increasing shear stress on the membrane surface. While membrane fouling can be reduced by membrane modification, membrane cleaning and other methods, a better understanding of the fouling phenomenon itself is crucial to its mitigation.

In this study, we compared the ultrafiltration of model dairy wastewater without and with turbulence promoter. We used a 3D printed turbulence promoter, which was designed based on our previous work. The comparison included the examination of the reduction of fluxes at different pressure values (0.1, 0.2 and 0.3 MPa), different mixing speeds (100, 200, 300 and 400 rpm) and the different fouling models. With the resistance-in series model, the Hermia model and the Makardij model, we investigated how the membrane fouling changes with the use of the promoter.

Keywords: dairy wastewater, fouling models, turbulence promoter, ultrafiltration

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