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**ultrasonic cleaning of particle and natural organic matter fouled**  
**cross-flow membranes**

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Membrane filtration has arguably been the most significant development in the area of water purification in the past 50 years. It has enabled many processes to become more reliable and to achieve purities that have not been achieved previously. One of the drawbacks of membrane use is fouling. In this research the ultrasonic cleaning of particle-fouled membranes was investigated. Specifically, we have explored the mechanisms responsible for ultrasonic cleaning and how solution conditions, particle conditions, cake layer effects, and ultrasonic conditions affect cleaning using scanning electron microscopy (SEM) and permeate flux measurements. We have investigated continual cleaning during membrane filtration in addition to cleaning after fouling. Results of this work will be discussed for cross-flow system configurations.