



جامعة الملك عبد الله
للعلوم والتقنية
King Abdullah University of
Science and Technology

TECHNOLOGY OPPORTUNITY



Pulsating Valve Reduces Clogging in Fluid Flow Membranes

Easily installed or retrofitted for wastewater treatment, desalination, and industrial processes

Designed for reverse osmosis water desalination plants, this technology is a mechanical method that reduces the need to clean biofouled membranes within an enclosed continuous fluid flow system. Organic matter present in water or other fluids tends to attach and grow on surfaces within the boundary layer of the flow. Filters and membranes are subject to clogging as these biofilms form, which reduces flow and requires frequent cleaning. By pulsing the flow of liquid, this technology reduces the amount of organic material that collects on membranes, minimizing downtime for cleaning cycles, prolonging membrane life, and lowering replacement costs.

Benefits

- ▲ **Efficient:** Reduces operational downtime and the number of cleaning cycles
- ▲ **Configurable:** Tunable to match the specifications of virtually any continuous fluid flow system
- ▲ **Simple:** No power required
- ▲ **Low cost:** Easy to install or retrofit on existing systems
- ▲ **Versatile:** Can be used in most continuous fluid flow systems

Applications

- ▲ Water desalination
- ▲ Wastewater treatment
- ▲ Industrial processing (e.g. gas, chemical, semiconductors)
- ▲ Offshore drilling seawater pumping
- ▲ Power plants (e.g. cooling towers, heat exchangers, boilers)
- ▲ Food processing (e.g. cheese, beer, juice)
- ▲ Pharmaceuticals

Technology Details

This innovation generates a pulsating flow through the membrane, which provides enough pressure to detach the colonies of bacteria before they can form large patches and ultimately an extensive biofilm.

How It Works

Powered either by a secondary high-pressure line or an external electric motor drive system, an eccentrically rotating impeller generates a periodic pulsing of fluid into the primary low-pressure line. The pulsating pressure causes a surge in the cross-flow velocity, placing the initial attached bacterial colonies in motion and detaching part or all of the organic material that has formed on the membranes. The pulse amplitude can be tuned by varying the size of the bore of the impeller, and the period of the pulse can be tuned by changing the amount of eccentricity between the impeller and its housing.

Why It Is Better

Competing products evaluate biofilm formation and provide cleaning via micro-waves, vibration, or gas-generated pulses. This innovation offers a purely mechanical method of preventing biofouling altogether. The technology requires no power, and the device can be integrated into existing systems. By reducing the need to clean clogged membranes in a fluid flow system, this technology helps companies reduce the downtime and expense of cleaning or replacing membranes, which increases overall operational efficiency.

IP Protection

KAUST has a patent pending for this technology.

Opportunity

This technology is part of KAUST's technology commercialization program that seeks to stimulate development and commercial use of KAUST-developed technologies.

Opportunities exist for joint development, patent licensing, or other mutually beneficial relationships.

For More Information

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