Optimization of Seawater Reverse Osmosis
Technology #16760

Applications

This technology is an optimization tool for energy efficient design and operation of a reverse osmosis plant.

Problem Addressed

Demand for the supply of fresh water throughout the world is increasing rapidly. Seawater desalination plants are rapidly expanding as natural water resources are depleting. Traditionally, thermal processes, such as Multiple-effect distillation and Multi-stage flash distillation, have been the most popular and economical methods for seawater desalination. However, seawater reverse osmosis (SWRO) has quickly gained popularity as an even more economical method due to recent advancements in the industry. Given that seawater desalination is a highly energy intensive process, energy costs are the major production costs in all large-scale seawater desalination methods. Therefore, tools to minimize the energy cost are eagerly sought.

Technology

This technology consists of a tool that supports three general designs, a one-pass system, a two-pass system with blending but no splitting, and a two-pass system without blending but with splitting and models them in Jacobian.

The user is able to provide the tool with the water flow arriving at the reverse osmosis section of the pump, the pressure and the pressure loss at the recovery device, operating temperature, pump efficiencies and fouling factors, and weight of the operation period length. The target recovery ratio and TDS of the permeate are also given and utilized by the optimization tool in the search of good designs or operating policies.

Advantages

- The tool provides functionality of manually selecting the control variables to automatically search the desired space of control variables to find energy efficient designs that meet the user's criteria
- The tool remains responsive while optimizing in order to allow the user to manually explore better designs while the engine is running

Categories For This Invention:

Water Treatment
Desalination
Intellectual Property:

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