



Multi-Stage Flash Desalination: Modeling, Simulation, and Adaptive Control (Engineering Systems and Sustainability)

Abraha Woldai

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Explore a Viable Resource for Desalination

The world's freshwater supplies are rapidly depleting and seawater is being positioned as a major feasible replacement in the search for a sustainable water source. Focused on large-scale multi-stage flash (MSF) seawater desalination plants, and based on research conducted on a real 18-stage plant, **Multi-Stage Flash Desalination: Modeling, Simulation and Adaptive Control** outlines the principles and processes of MSF desalination and highlights the state of the art in MSF desalination modeling, simulation, and control.

This book offers a brief overview of MSF plants, explains the importance of the various control systems for large MSF plants, and describes methods of mathematical modeling centered on physical phenomena in the MSF process. It introduces a developed dynamic model and illustrates the simulation of the model using an equation-based flowsheet simulation package (SPEEDUP) from AspenTech. It also presents a method for finding and using a non-parametric model in designing optimal PID control systems and recommends an adaptive scheme that maintains optimal plant operation over a range of operating conditions. The improvements suggested by the author for PID controllers are pervasive in desalination plants of high dimension and also relate to other process industries with comparable conditions. He also discusses the use of renewable energy sources for desalination and stresses the potential of solar energy in the Arab region, an area known for its aridity and scarcity of water.

The text:

- Details the dynamic model of the various elements in an MSF plant
- Considers the obtained model as well as available measurement data
- Presents a developed model for use in PID control
- Provides descriptions, listings, and additional reference material for further research

Multi-Stage Flash Desalination: Modeling, Simulation and Adaptive Control covers the processes of desalination and the operation and control of MSF plants for large-scale desalination and provides you with a greater understanding of dynamics, operation, and control.

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