Once through multistage flash desalination: gPROMS dynamic and steady state modeling

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ABSTRACT

This study focuses on modeling the steady state and dynamic behavior of the multistage flash desalination process (MSF) using gPROMS. This modeling tool allows for simultaneous coding of the system dynamics and steady state performance. In addition, it allows the use of the most efficient solvers for a set of non-linear differential and algebraic equations describing the MSF process. The system model and analysis are based on actual plant data that includes 21 flashing stages and a capacity of 378 kg/s (32,000 m^3/d). The simulated unit is part of a massive MSF installation in Doha, Kuwait. System's dynamic behavior is simulated by a step change in the input values of the main operating parameters, such as the feed flow rate and the top brine temperature. Finally, the analysis of model predictions for both steady-state operation and system dynamics have been compared to actual plant data, showing a good agreement between predicted and measured trends.

Keywords: Desalination; Modeling; Multistage flashing; Steady state; Dynamics; Control

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