Hybrid thermal–thermal desalination structures

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ABSTRACT

Opportunities exist to improve industrial-scale thermal desalination system performance and reliability through novel process structures. Herein, hybrid thermal–thermal desalination structure concepts that combine the merits of MSF, MED, or MED-TVC are proposed. The first is a system which transitions from forward-feed MED effects to parallel-cross MED effects (FF-PC-MED) and could be combined with TVC (FF-PC-MED-TVC). The second is a system which transitions from MSF stages to forward-feed MED effects (MSF-MED) and employs a vapor routing for MSF which typically not used. Finally, the last system uses parallel steam supplies to power MSF stages and MED-TVC effects configured in series (MSF-MED-TVC). Through the simulation of their performance, it is found that these concepts can exhibit higher performance ratio and/or lower specific heat transfer surface area as compared to standard thermal desalination configurations for fixed operating conditions. While these results indicate that the hybrid thermal–thermal desalination structures are promising alternatives to standard thermal desalination configurations, detailed modeling, and numerical optimization of the concepts is necessary in future work.

Keywords: MSF; MED; Thermal desalination; Structural optimization; Optimal design

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