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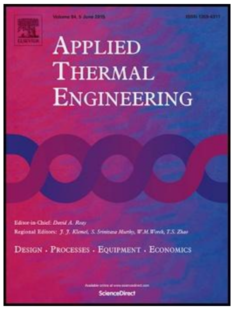

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Parametric study of operating and design variables on the performance of a membrane-based absorber

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Highlights:

- A microchannel H_2O-LiBr absorber using a microporous membrane is simulated.
- Sensitivity of cooling capacity/absorber volume to various parameters is evaluated.
- Parameters to be optimized at the design stage of the absorber are identified.
- Porosity, pore diameter, solution channels depth and membrane thickness are crucial.
- Vapour pressure and solution inlet temperature and concentration should be optimized.

Abstract

A plate-and-frame microchannel H_2O-LiBr absorber using a microporous membrane as contactor between the vapour and the solution is simulated. The heat and mass transfer equations, describing the absorption of the vapour phase into the solution, are solved for different membrane properties and for variable design and operating conditions. The parametric study evaluates the sensitivity of the ratio between the cooling capacity of the chiller and the absorber volume (r_{qV}) to changes in the following parameters: width and height of the solution and cooling water channels; concentration, temperature and mass flow rate of the solution; temperature and mass flow rate of the cooling water; porosity, pore diameter, thickness and thermal conductivity of the membrane; thickness and thermal conductivity of the interface wall between the solution and the cooling water; and temperature, pressure and mass flow rate of the vapour. At the design stage of the membrane absorber, the parameters that can be optimized to maximize r_{qV} are porosity, pore diameter, solution channels depth and membrane thickness. The thickness of the

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