290w A Theoretical and Experimental Method of Enhancing Mass Transfer in Flat Plate Membrane Distillation Using CFD

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One of the main problems of a flat plate membrane distillation module is the poor mixing and the presence of temperature boundary layers along the main feed and permeate channels. One way to overcome this is to use mesh spacers instead of open flow spacers. This work reports the results of a study of a three dimensional computational fluid dynamics (CFD) simulation for the prediction of the permeate flux, pressure drop and temperature distribution. For the analysis a commercially available CFD code (ANSYS CFX) was used.

To validate the CFD predictions laboratory experiments were carried out using a flat plate membrane module built in situ. Membranes were provided by Millipore, Gore and PallGelman, while DellStar Inc provided the four different types of Naltex extruded netting used as spacers. The results have shown that the use of turbulence spacers enhances the mass transfer and reduces the temperature boundary layer, however it significantly increases the pressure drop.