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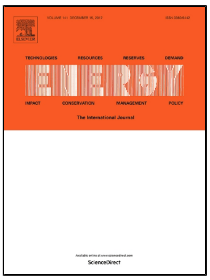

Direct contact membrane distillation system for waste heat recovery: modelling and multi-objective optimization

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Direct contact membrane distillation system for waste heat recovery: modelling and multi-objective optimization

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Abstract

Direct contact membrane distillation (DCMD) is an alternative technology to utilize the low temperature waste heat source for water supply. In this paper, we proposed a modified model characterizing the heat and mass transfer in the DCMD, which was validated by a great accordance with the experiment data. For evaluating the performance of a DCMD system with heat recovery, gain output ration (GOR) and mass recovery rate are two main criteria, however, they could not achieve their maximum values simultaneously. To achieve such a compromise, a multi-objective optimization considering both the water recovery rate and GOR was conducted. Besides, the GOR, mass recovery rate and thermal efficiency under single-objective optimization methods were calculated and compared. Compared to the results under the maximum GOR, the increase magnitude of water mass recovery rate under the multi-objective optimization override the decrease magnitude of GOR. Compared with the performance under the

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