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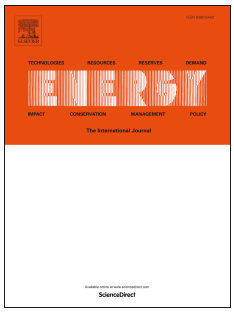

Modeling and parametrical analysis on internally-heated liquid desiccant regenerator in liquid desiccant air conditioning

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Modeling and parametrical analysis on internally-heated liquid desiccant regenerator in liquid desiccant air conditioning

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Abstract:

In this paper, the mathematical models of pre-heated and internally-heated liquid desiccant regenerator are established including parallel flow, counter flow and cross flow with two kinds of different flow directions of heated water respectively. Simulation results reflect that regeneration performances of the internally-heated are about 2-4 times that of the pre-heated in most conditions, greatly depended on the ratios of flow-rate of solution to air (m_s/m_a) and water to air (m_w/m_a) respectively. The regeneration performances, when the heated-water flows counter to solution, are superior to that of heated water parallel to solution. And the regeneration performances generally increase with increases in the NTU_1 and NTU_2 while a fitted curve combining NTU_1 with NTU_2 occurs to indicate the fastest increase in regeneration performance. Although the concentration difference increases with the m_s/m_a reducing, the evaporation rate gets its maximum value when the ratio of mass flow-rate of solution to air is equal to 0.2. The regeneration performances increase with increasing air temperature and decreasing its moisture content as well as linearly increase with higher inlet temperature of heated-water, but decrease with increasing solution concentration. The proposed regeneration mode and flow pattern will be helpful in the design and optimization of the regenerators.

Keywords: internally-heated; concentration difference; flow-rate ratio; *NTU*

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