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Development of an NH_3/H_2O Absorption Chiller for Solar Cooling

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Solar cooling is a logical and sustainable technology from the fact that cooling is provided by solar energy, the perpetrator that creates the cooling demand. And among the various technologies for the application, absorption chillers are most popular in many studies. They have been regarded as most suitable option for solar cooling; because they are compact, reliable and can be easily integrated into existing systems.

But not all solar absorption systems are beneficial. Since the driving energy, solar radiation, is highly time-dependent and intermittent, a system, which is designed, ignoring this dynamic nature, is not likely to offer much benefit. And because an absorption chiller consists of many heat and mass exchangers and reservoirs which make the system generally bulky and sluggish. Therefore it is very important to design a system which is quick and light so that it can take full advantage of the energy coming from the sun.

Control strategies are also important in this respect. In the start up period, for example, concentration, volume and flow conditions inside each component are totally different from the design conditions. If the system is not controlled properly in this period, it could waste valuable solar time or, in the worst case, could even be brought into a stagnation position.
Understanding dynamic characteristics of an absorption system is not a simple task. Because there are so many parameters intricately interrelated, it is even often difficult to separate the single effect of one parameter from the others in experimental data.

In this paper, some experimental and simulation results of an NH_3/H_2O absorption chiller will be presented and discussed.

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