

PERFORMANCE STUDY OF A SOLAR THERMAL POWER PLANT

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ABSTRACT

In aqua ammonia based Kalina power system, first, ammonia starts vaporization due to its low boiling point compared to the water. In the current work, a low temperature Kalina cycle has been investigated to optimize the heat recovery from solar thermal energy. Thermodynamic parameters have been developed to describe the thermal behavior of the cycle. Hot water coming from solar parabolic trough collector with vacuum tube receiver is used to generate ammonia-water vapor for power generation. The turbine inlet conditions are optimized to match the variable hot water temperature due to intermittent nature of solar energy. The key parameters focused in this study are hot water inlet temperature, concentration at turbine inlet and vapor mass fraction in separator. The current work can be used to select the more efficient conditions to separator and mixture turbine. Solar parabolic collectors with vacuum tubes at the focal points have been developed to run the thermal power station.

KEY WORDS: Ammonia-water mixture, heat recovery, Kalina cycle, solar energy, thermodynamic analysis