Abstract of Invited Speech 2

Thermodynamic Modelling and Analysis of Kalina Cycle System for Utilization of Low Grade Thermal Energy

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Abstract

Energy is an essential requirement for almost all the activities in our day-to-day life. It plays a vital role in the economic growth of any nation. Most of our energy demands are being met by the use of fossil fuels. With a rapid increase in the rate of power consumption and the cost of diminishing fossil fuels coupled with stringent environmental policies, the gap between supply and demand of electricity is conceivable. Technology supports promptly to develop newer methods for generating electricity from renewable energy resources and for enhancing the performance of existing energy conversion systems. Strong commitment and serious effort is now needed to utilize all types of feasible energy resources to overcome the possible power supply constraints and to meet the rapidly growing energy demand.

With the advent of binary mixture working fluid, new possibilities have been emerged that reduce exergetic losses in power cycles. The binary mixture working fluid possesses thermodynamic advantages compared to single component working fluid. At a constant pressure, a two component mixture boils and condenses at varying temperature. This makes the temperature profile of the working fluid to adjust better with the temperature profile of the heat source and the heat sink. NH3-H2O mixture is the best known binary mixture used in power cycles. Power cycle that uses NH3-H2O mixture as working fluid is known as Kalina cycle. Kalina cycle system shows higher thermal performance in utilisation of heat from a low grade thermal source such as industrial hot gas stream, municipal incinerators, solar-heated fluid stream, and geothermal fluid. With the increasing demand of electric power, the future of Kalina cycle systems for generating electricity from low grade thermal energy sources appears to be bright. This talk covers description of the Kalina cycle, working fluid properties, comparison between the Rankine cycle and Kalina cycle, applications of Kalina cycle, Energy and Exergy analysis of the Kalina cycle and technical concerns for application of the Kalina cycle. The author would present some of the approaches that have been developed and thus provide an update of the progress made in developing Kalina cycle systems for low grade thermal energy applications.