DEVELOPMENT OF A MAXIMUM POSSIBLE EFFICIENCY FOR GAS REFRIGERATION CYCLE

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ABSTRACT

The interest in utilizing the energy in the heat sources and reducing waste heat is widely investigated. Air is free, non-explosive, non-flammable, non-toxic and available in nature. However, the research in such applications is very limited. This study investigates the potential of using air as a working fluid in the refrigeration cycle for improving the refrigerating effect, as well as the coefficient of performance of the cycle. The objective of this research is to investigate the optimum pressure ratio, isentropic efficiency of the compressor and expander, the inlet temperature of the compressor and expander that will affect the coefficient of performance of the cycle. At the initial of this study, the thermodynamics analysis of the gas refrigeration cycle is performed. The gas refrigeration cycle is performed with the aided of computer simulation software in order to know the trend of the parameters playing. The gas refrigeration cycle examines that the coefficient of performance of the cycle is mainly affected by pressure ratio and the effectiveness of the heat exchangers. There is exists of the optimal pressure ratio in the range of 2 to 5 for the gas refrigeration cycle. The heat exchangers effect on the coefficient of performance of a gas refrigeration cycle with a given cooling load has also been discussed. The optimal effectiveness of the heat exchanger is 0.85, which performs the best performance in the cycle. The results obtained from the researches provide base line criteria for use in the performance evaluation and design the optimum efficiency of the gas refrigeration cycle.

Keywords: Gas refrigeration cycle, pressure ratio, heat exchanger, coefficient of performance