SIMULATION OF THREE STAGE VAPOUR COMPRESSION REFRIGERATION CYCLE WITH SINGLE EVAPORATOR AND FLASH INTERCOOLING

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ABSTRACT

The objective of this paper is to develop a novel approach for steady state simulation of multistage vapour compression refrigeration cycles in MATLAB simulink R 2010a. The multistage cycle consists of three compressors operating in series, three expansion valve, two flash intercoolers and single evaporator where refrigerant is R134 a. In this mathematical model, empirical relations for ideal process and polynomials generated for refrigerant R134a (CH_2FCF_3) are used to derive performance parameters of refrigeration cycle. Properties are calculated at all saturation and superheated states after that first law and second law analysis of mentioned refrigeration cycle is performed using state properties. Present work investigates the effects of varying pressure ratio, evaporating temperatures, and condensing temperatures and observes its response on the coefficient of performance, the second law coefficient of performance, second law efficiency and total energy losses. It has been observed that condensing and evaporating temperatures have strong effect on coefficient of performance of cycle. The temperature after the flash intercooler and refrigeration effect has been chosen as constant. The aim is to maximise coefficient of performance and minimize losses.

KEYWORDS: COP, Design and simulation, Efficiency, Exergy Loss.