Exergy Analysis On Simple Brayton Cycle And Regenerative Brayton Cycle

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ABSTRACT

Exergy analysis is crucial to determine the potential energy can be extracted from sources of energy into a system. Awareness of depletion of world's energy resources is one of main problem faced and energy analysis may mislead different view of point as may define technological efficiency is higher than actual existence performance but yet obtain the best possible performance. The aim of this report is to investigate exergy behavior on simple Brayton cycle and regenerative Brayton cycle with respect of change of relevant parameters such as pressure ratio, isentropic efficiency, turbine inlet temperature, minimum entropy generation and ambient temperature on the exergy efficiency. Explicit relationships are established between pressure ratio with exergy efficiency and first law efficiency. Other parameters of isentropic efficiency, turbine inlet temperature and ambient temperature were also varied with respect of pressure ratio and exergy efficiency relationship. Results indicated that pressure ratio brings most significant effects on exergies on these two cycles and found the availability percentages of both cycles. Continues equality is turbine inlet temperature and ambient temperature then isentropic efficiency of components parameters. While for minimum entropy generation parameter implemented dimensionless equation analysis with respect of exergy efficiency and net work which lead to different interesting meaning of tendency of energy dispersal which does not correlated with objective function or net work output but related to equilibrium. According to the boundary condition fixed, the optimum balanced design is recommended at pressure ratio equal to 9.3 for simple Brayton cycle and 5.2 for regenerative Brayton cycle as both cycles sacrifice of about 2% out of both maximum performance of net work and exergy efficiency. Exergy analysis evaluated the irreversibility of whole cycle and evaluates the losses of Brayton cycles.