A comparative study of using simple and ejector-absorption refrigeration for inlet air cooling of simple and regenerative gas turbine

\\textbf{Keywords:} Gas Turbine, Inlet Air Cooling, Absorption Refrigeration, Ejector, Regenerative Gas Turbine

The exhaust gases of gas turbine power plant carry a significant amount of thermal energy that is usually expelled to the atmosphere; this causes a reduction in net work and efficiency of gas turbine. On the other hand, the generated power and efficiency of gas turbine plants depend largely on the temperature of the inlet air, so that they both increase as the inlet air temperature decreases. The mentioned two problems can be solved by installing an absorption refrigeration cycle (ARC) at gas turbine inlet, working with thermal energy of exhaust gases. In this research, effect of inlet air cooling on gas turbine performance is studied. The work shows that, the net work and the efficiency will increase by \(0.1\%-0.6\%\) and \(5.1\%-5.6\%\) respectively for every \(1.0^\circ\text{C}\) decrease of inlet temperature. Since, coefficient of performance (COP) of ARC is low, with high pressure ratios in simple gas turbine (SGT) and with low pressure ratios in regenerative gas turbine (RGT), thermal energy of exhaust gases can not supply all the needed thermal energy for refrigeration cycle. The results show that, when an ejector is included in refrigeration cycle, the need for external energy source required for refrigeration cycle is reduced.

**References:**

Garooci Farshi - Master of Science Bonab Islamic Azad University, Iran
Seyed Mahmoudi - Associated of Professor Faculty of Mechanical Engineering, Tabriz University, Tabriz, Iran
Mosafa - Master of Science Bonab Islamic Azad University, Iran