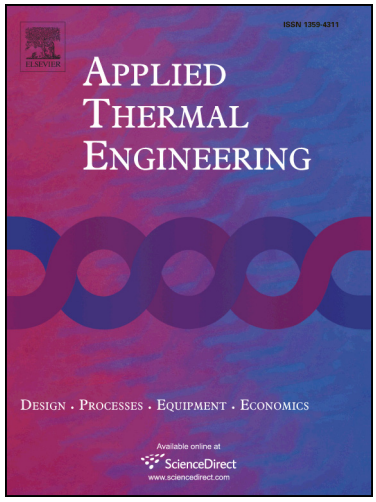

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Thermodynamic Assessment of a Gas Turbine Power Plant Integrated with an Adsorption Refrigeration System

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Abstract

Significant amount of world's power generation comes from gas turbine and coal based power plants which release high temperature exhaust gas to the atmosphere, wasting valuable energy and contributing enormously to the global warming. In this scenario, to harness the waste energy, a cogeneration system combining power, and cooling into a single system has been proposed in this paper. The paper presents a thermodynamic analysis of a gas turbine power plant integrated with an adsorption refrigeration system which is driven by the waste exhaust heat of the power plant. A mathematical model has been developed to estimate the net power output of the gas turbine plant and validated with previously reported work. Later, adsorption refrigeration system with activated carbon-HFC134a pair has been incorporated in the mathematical model and performance of the complete system is evaluated based on the parameters such as coefficient of performance (COP), refrigeration capacity, exhaust gas temperature and primary energy rate (PER) and their variation with the ambient and desorption temperatures is presented.

Keywords: Cogeneration system, Adsorption refrigeration system, COP, Thermodynamic analysis, Exhaust gas temperature.

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