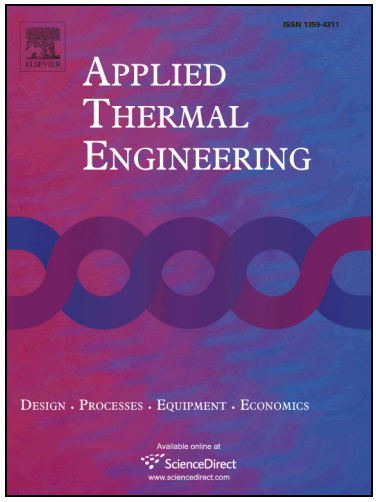

Research Paper

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Thermodynamic Investigation of parameters affecting the Execution of Steam Injected Cooled Gas Turbine based Combined Cycle Power Plant with Vapor Absorption Inlet Air Cooling

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Abstract

Present paper deals with the thermodynamic investigation of influence of different parameters in steam injected cooled gas turbine based combined cycle power plant employing vapor absorption cooling of inlet air and two pressure heat recovery steam generator. Vapor absorption cooling scheme is run by utilizing the heat energy of the exhaust gas at the exit of HRSG. Gas turbine blades are cooled using film cooling technique. A study of the influence of ambient conditions, cycle pressure ratio, and turbine entry temperature on plant performance has been carried out. It has been noted that the efficiency of gas turbine improves by upto 6.91% and specific work output enhances by 16.42% with the integration of vapour absorption inlet air cooling to the simple cycle. The CCPP specific work output advances 17.34% at given turbine entry temperature as the steam to air ratio increases from 3% to 7% at the cycle pressure ratio of 24. Similarly thermal efficiency of CCPP increases by 6.78% for same cycle pressure ratio of 24 and the constant increment in steam to air ratio from 3 to 7%.

Key words: Combined cycle, steam to air ratio, film cooling, vapor absorption