

Four E analysis and multi-objective optimization of combined cycle power plants integrated with Multi-Stage Flash (MSF) desalination unit

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Abstract

4E analysis and multi-objective optimization for a combined cycle power generating unit with a Multi stage flash (MSF) desalination unit are investigated in this paper. The first objective function was considered as the sum of investment and operational costs as well as penalty for producing NO_x emissions. The second objective function was the cycle total amount of exergy destruction. Genetic algorithm optimization technique was applied to obtain the optimum values of design parameters such as Heat Recovery Steam Generator (HRSG) drum pressure, pinch point temperature in HRSG, top brine temperature in MSF, last stage temperature of MSF and number of MSF stages. Also the effects of gas turbine part load, as well as ambient temperature and fuel cost changes on the optimal values of design parameters were analyzed.

Keywords: CHP, Desalination, 4E Analysis, Optimization

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