

## Type-2 Fuzzy Programming for Optimizing the Heat Rate of an Industrial Gas Turbine via Absorption Chiller Technology

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**Abstract :** Terms set in power purchase agreements (PPA) challenge power utility companies in balancing between the returns (from maximizing power production) and securing long term supply contracts at capped production. The production limitation set in the PPA has driven efforts to maximize profits through efficient and economic power production. In this paper, a combined industrial-scale gas turbine (GT) - absorption chiller (AC) system is considered to cool the GT air intake for reducing the plant's heat rate (HR). This GT-AC system is optimized while considering power output limitations imposed by the PPA. In addition, the proposed formulation accounts for uncertainties in the ambient temperature using Type-2 fuzzy programming. Using the enhanced chaotic differential evolution (CEDE), the Pareto frontier was constructed and the optimization results are analyzed in detail.

**Keywords :** absorption chillers (AC), turbine inlet air cooling (TIC), power purchase agreement (PPA), multiobjective optimization, type-2 fuzzy programming, chaotic differential evolution (CDDE)

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