

## Optimizing Boiler Combustion System in a Petrochemical Plant Using Neuro-Fuzzy Inference System and Genetic Algorithm

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**Abstract :** Boiler is one of the critical unit in a petrochemical plant. Steam produced by the boiler is used for various processes in the plant such as urea and ammonia plant. An alternative method to optimize the boiler combustion system is presented in this paper. Adaptive Neuro-Fuzzy Inference System (ANFIS) approach is applied to model the boiler using real-time operational data collected from a boiler unit of the petrochemical plant. Nonlinear equation obtained is then used to optimize the air to fuel ratio using Genetic Algorithm, resulting an optimal ratio of 15.85. This optimal ratio is then maintained constant by ratio controller designed using inverse dynamics based on ANFIS. As a result, constant value of oxygen content in the flue gas is obtained which indicates more efficient combustion process.

**Keywords :** ANFIS, boiler, combustion process, genetic algorithm, optimization.

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