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Temperature Balancing in Steam Methane Reforming Furnace via an Integrated CFD/Data-Based Optimization Approach

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Abstract

In this work, we introduce a furnace-balancing scheme that generates an optimal furnace-side feed distribution that has the potential to improve the thermal efficiency of a reformer. The furnace-balancing scheme is composed of four major components: data generation, model identification, a model-based furnace-balancing optimizer and a termination checker. Initially, a computational fluid dynamics (CFD) model of an industrial-scale reformer, developed in our previous work, is used for the data generation as the model has been confirmed to simulate the typical transport and chemical reaction phenomena observed during reformer operation, and the CFD simulation data is in good agreement with various sources in literature. Then, we propose a model identification process in which the algorithm is formulated based on the least squares regression method, basic

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