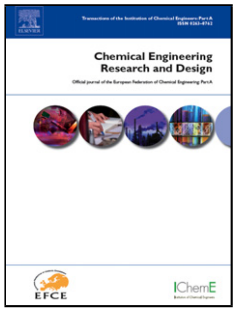

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Real-Time Furnace Balancing of Steam Methane Reforming Furnaces

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Abstract

This paper focuses on the development of a real-time furnace-balancing scheme for a reformer at a centralized hydrogen facility using steam methane reforming (SMR) technology so that the reformer fuel input can be optimized in real-time to increase the plant throughput and to reject operational disturbances associated with flow control valves. Initially, the framework for the furnace-balancing scheme, the statistical-based model identification and the valve-to-flow-rate converter developed in Tran et al. (2017a, 2018) are integrated with a heuristic search algorithm to create a real-time balancing procedure, which recursively calculates different total fuel flow rates of which the respective spatial distribution to burners is optimized until key operational specifications, e.g., the reformer throughput is maximized, and the outer tube wall temperature (OTWT) along the reforming tube length of all reforming tubes must not exceed the design temperature of the reforming tube wall, are satisfied. Subsequently, a computational fluid dynamic

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