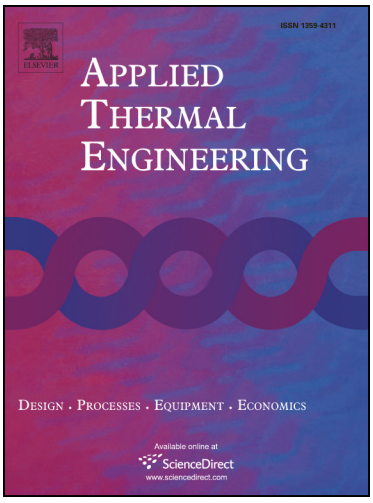

Research Paper

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PII: S1359-4311(17)31628-9
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.05.079
Reference: ATE 10391

To appear in: *Applied Thermal Engineering*

Received Date: 9 March 2017
Revised Date: 11 May 2017
Accepted Date: 14 May 2017

Please cite this article as: E. Keshavarz, D. Toghraie, M. Haratian, Modeling industrial scale reaction furnace using computational fluid dynamics: a case study in Ilam Gas Treating Plant, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.05.079

Modeling industrial scale reaction furnace using computational fluid dynamics: a case study in Ilam Gas Treating Plant

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Abstract

In this study, the industrial scale reaction furnace of Ilam gas treating plant has been modeled by using of 3D computational fluid dynamics (CFD) method and the impact of checker-wall, refractory, ceramic seals are investigated. The simulation findings showed that Oxygen and acid gas at center tend to swirling when encounter to blades of air and acid gas diffusers, respectively as passes through furnace and directed to conical wall. Finally, good mixing between air and fuel is provided for combustion. Moreover, Sulfur dioxide is formed at beginning of flame, middle stage and before of choke-ring area and continues till checker-wall. Maximum production of Sulfur dioxide is attributed to pre-choke ring area. From obtained results, it can be found that Sulfur dioxide is formed at interface of air and acid gas and reaches to its maximum rate at air swirling area. Sulfur dioxide and Oxygen have a decreasing trend after checker-wall. The results also revealed that amount of radiation and tube-sheet temperature are reduced about 10571W/m^2 and 17.63°C, respectively, when checker-wall exists in the reaction furnace.

Keywords: Reaction furnace, Checker-wall, Combustion, computational fluid dynamics, Ilam Gas Treating Plant

1. Introduction