Dynamic Modeling of a Thermally Coupled Waste Heat Boiler in an Industrial Catalytic Reactor

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Abstract

In this paper, dynamic modeling of an internal waste heat boiler is investigated which is used to capture reaction heat of an industrial reactor for water vapor production. Waste heat boiler system consists of evaporator and superheater tubes sections and a make-up steam drum. A mathematical lumped model has been used to describe the dynamics of this system in case of drainage. The effect of mass flow rate of drainage on gas side and superheated steam side temperature were presented. The model results showed the same trend in comparison to plant data. It is estimated that there should be an appropriate drainage to inhibit the temperature of superheated steam not to exceed from design value and safe operation of plant.

Keywords: Dynamic modeling, Waste Heat Boiler, Drainage, Lumped model

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