Interpretation of the Heat Transfer Coefficient in a CFB Heat Exchanger System for Flue Gas Heat Recovery

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Summary

To overcome the fouling of fly ash on the heat transfer surface and erosion and periodical cleaning which are the major problems in conventional heat exchangers for flue gas heat recovery, a new fluidized bed heat exchanger with automatic particle controlling is developed. The heat transfer performance and pressure drop have been evaluated through experiments for the gas-to-water lab scale heat exchanger system. The analytical procedures for calculating the performance parameters such as heat transfer coefficient of conventional heat exchangers are not applicable to heat exchangers utilizing fluidized bed because of the characteristics of fluidized beds. An experimental investigation was carried out to study the effects of fluidized bed on heat transfer for both the single riser and the multiple riser heat exchanger. Several models are described to explain the evaluation process of heat transfer coefficient and the role of particle diameter and suspension density on heat transfer coefficient.

The heat exchanger system for flue gas heat recovery with circulating fluidized bed is found to give satisfactory results. For both cases, the single riser and multi riser system shows better heat recovery when operated with circulating particles. The bed to wall heat transfer coefficient was found to increase with suspension density for a fixed particle size. In future the research plan include to develop a mathematical correlation to estimate the heat transfer coefficient from the operating parameters such as suspension density and particle size. Comparison of the experimental results of heat transfer coefficient with the correlation developed will also be investigated and comparison with other researchers work will also be studied to qualify the correlation developed through our research.

References

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