

Thermal-Fluid Characteristics of Heating Element in Rotary Heat Exchanger in Accordance with Fouling Phenomena

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Abstract : To decrease sulfur oxide in the flue gas from coal power plant, a flue gas de-sulfurization facility is operated. In the reactor, a chemical reaction occurs with a temperature change of the gas so that sulfur oxide is removed and cleaned air is emitted. In this process, temperature change induces a serious problem which is a cold erosion of stack. To solve this problem, the rotary heat exchanger is managed before the stack. In the heat exchanger, a heating element is equipped to increase a heat transfer area. Heat transfer and pressure loss is a big issue to improve a performance. In this research, thermal-fluid characteristics of the heating element are analyzed by computational fluid dynamics. Fouling simulation is also conducted to calculate a performance of heating element. Numerical analysis is performed on the situation where plugging phenomenon has already occurred and existed in the inlet region of the heating element. As the pressure of the rear part of the plugging decreases suddenly and the flow velocity becomes slower, it is found that the flow is gathered from both sides as it develops in the flow direction, and it is confirmed that the pressure difference due to plugging is increased.

Keywords : heating element, plugging, rotary heat exchanger, thermal fluid characteristics

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