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EXPERIMENTAL INVESTIGATION ON WET FLUE GAS DESULFURIZATION WITH ELECTROSTATICALLY-ASSISTED TWIN-FLUID ATOMIZATION

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Abstract

A wet flue gas desulfurization (WFGD) system adopting electrostatically-assited twin-fluid atomization injector was presented. Spatial distributions of the droplet sizes, velocity for different voltages were measured using limewater and SO_2 removal efficiency for different voltages and Ca/S ratios were tested using limewater drops. The physical and chemical improvement mechanisms were analyzed using spray characteristics and double film theory. The analysis showed that electrostatically-assited atomization could improve the spray characteristics, which could decrease the average droplets size, avoid the agglomeration of drops, and improve drops velocity spatial distribution. The SO_2 removal efficiency could be increased because of physical properties which were decreasing average droplets size, making the drops more uniformity distribution in reactor, and enhancing drops inner circling and chemical properties which were increasing the Ca^{2+} concentration on the droplets surface and enhancing mass transfer driving force droplets absorbing SO_2 due to droplets electrification and non-excess charge polarization where electrical field existing.

Key words: desulfurization, electrostatic effect, removal efficiency, spray characteristics, twin-fluid atomization

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