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FLUE GAS DEDUSTING IN VENTURI SCRUBBERS AT THERMAL POWER PLANTS

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Abstract

In this paper, an improved engineering model and analysis techniques are presented of the fly ash particles coagulation with droplets in Venturi tubes of industrial scale, based on spatial variation of the collection efficiency of particles on individual droplets, accounting for spray water flow polydispersity and particle size distribution, which allows to define optimal droplets size and spray water flow rate at different modes of thermal power units operation. The model is validated with the published experimental data on the wet Venturi scrubbers operations at the thermal power plants (TPP) in Ukraine, Russia and Kazakhstan. The results of calculations demonstrate good coincidence with experimental data. The influence of the boiler load and spray water consumption on an efficiency of the TPP Venturi wet scrubbers was studied. The simulation results have shown that moderate increment of spray water consumption up to 0.24 L/m^3 allows increasing of the Venturi wet scrubber's efficiency without threat of reaching the dew point in flue gas flow, thus preventing potential corrosion of the power plant equipment downstream. The calculations confirmed that without retrofit of wet scrubbers installed at Ukrainian power plants it will not be possible by these stations to meet European requirements on the allowable levels of emissions from the coal firing power plants.

Keywords: dedusting, flue gas, fly ash particles, Venturi scrubber

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