<<第11届国际电除尘学术会议论文集-E>>

图书基本信息

书名：<<第11届国际电除尘学术会议论文集-Electrostatic Precipitation>>

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内容概要

Electrostatic Precipitation includes selected papers presented at the 11th International Conference on Electrostatic Precipitation. It presents the newest developments in electrostatic precipitation, flue gas desulphurization (FGD), selective catalytic reduction (SCR), and non-thermal plasma techniques for multi-pollutants emission control. Almost all outstanding scientists and engineers world-wide in the field will report their on-going researches. The book will be a useful reference for scientists and engineers to keep abreast of the latest developments in environmental science and engineering.

书籍目录

章节摘录

Cp is the time-dependent gas-phase concentration of mercuryadjacent to the particle surface, which is assumed to be inequilibrium with the solid-phase mercury concentration at theparticle surface, Although fly ash is known to have varying adsorptioncapacities for mercury [13, 14], for simplicity, the presentalgorithm does not address fly ash adsorption of gas-phasemercury. The comparisons between the present algorithm andfull-scale ACI results are limited to the additional mercurycapture observed to occur across an ESP during ACI. Ourprevious analysis [8] concluded that even under idealizedconditions, wall boundary mass transfer of gas-phase mercuryto the ESP plate electrodes is slow, contributing a relativelysmall portion of the total mercury removal within typicallysized ESPs;the dilution of the powdered sorbent on the ESPplate electrodes by the much larger（~O（102））amounts of flyash further diminishes the contribution of this removalmechanism. The model, as described previously [8-12], employs thefollowing assumptions:l.No mercury adsorption by native fly ash;2.No mercury adsorption by internal ESP surfaces:3. Powdered sorbent is uniformly distributed throughout flue gas at ESP inlet:4. Powdered sorbent mass concentration（g/m3） varies only in the streamwise direction within the ESP;5. All particles attain their theoretical maximum particlecharge;6.Fixed value of electric f'ield voltage（54kV）The algorithm also employs additional assumptionsregarding particle dielectric constant（very large）, particlesphericity（perfect）, flue gas pressure（atmospheric）andthermodynamic properties（ideal）and particle losses due toagglomeration, and rapping reentrainment and sneakage forthe ESP（neglected）.For all model results, the algorithm usessorbent physical properties equaJ to those of NORIT Hgpowdered activated carbon （PAC）, primarily because of themany full-scale tests in which it has been used. In addition, and unlike other sorbent manufacturers, NORIT has made thedetailed particle size distribution for tFus product readilyavailable, which we have shown previously [10] has a stronginfluence on in-flight mercury capture. Fig. 1 shows themeasured particle size distribution of the NORIT Hg PACand the two curve fits（above and below 35 um）used torepresent it in the model. Because flue gas composition isknown t, o affect the rate and capacity of any sorbent to adsorbmercury, a lumped capacitance-mass transfer model of in-flight mercury capture would require some measure of the mercury adsorption capacity of a given sorbent at a particularsite. Several of' the early full scale tests reported fixed bedequilibrium adsorption capacity for the NORIT PAC;however, subsequent full-scale tests eliminated this measure, for reasons and with implications that will be discussed. In theabsence of site-specific mercury adsorption capacity measure-ments for the NORIT Hg sorbent, estimates are used for the equilibrium adsoiption capacity based on coal rank, an approachwhose results and implications also will be discussed. A collection of eleven full-scale tests of sorbent injectioninto cold-side ESPs using NORIT Hg sorbent constitute thefield data against which the model results are compared: SixDOE-NETL-sponsored tests（Monroe 4, Leland Olds, MiamiFort 6, Brayton, Pleasant Prairie（PPPP）, Meramec 2）and fiveproprietary, privately funded tests referred to here as Plants Athrough E. Table 1 presents a number of key parameters fromeach test program at each site. For DOE-NETL tests, many ofthe parameters can be found in the quarterly and final reportsassociated with each test program. In some instances, missingparameters were deduced from the available information（e.g., obtaining mean flue gas velocity from ESP geometry anddesign ESP specific collection area, SCA）or gleaned fromdiagrams and blueprints requested from the site operators.3 RESULTS

Figs. 3 to 5 present comparisons between the model results and the full scale ACI results at the eleven sites. Of the eleven full-scale ACI results, two-those from Brayton and Pleasant Prairie-provide on-site measurements of equilibriummercury adsorption capacity of the NORIT Hg powderedactivated carbon, using a fixed sorbent bed applied to a slipstream of the local flue gas. The present, model requires as input a value for the equilibrium adsorption capacity of thesorbent, which determines the rate at which each sorbentparticle approaches saturation during mercury adsorption, which in turn determines the rate at which the gas-phasemercury concentration at the particle surface（Cp（t））approaches the far-f'ield value（cv（tD（see Eq. 1）.In theabsence of measured, site-specific equilibrium mercury adsorption capacity at the other nine sites, a rough assumptionwas made that sites burning similar coals would exhibitsimilar equilibrium mercury adsorption capacities for thesame sorbent.

Although mercury adsorption kinet, ics are clearly much more complex than this assumption implies, it permits validation of the model against rune sites rather than two, and in its imprecision provides an opportunity to assess the degree to which each site's performance deviates from the ideal, mass-transfer-limited result. ……

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