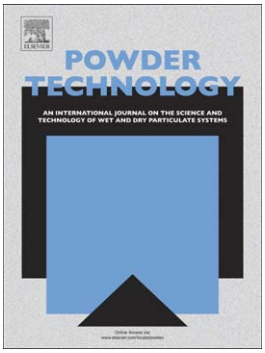

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Investigation into the parameters of influence on dust cake porosity in hot gas filtration

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Abstract

The development of robust and cost-effective hot gas filtration technologies is crucial to facilitate the implementation of advanced coal-based power systems. Understanding the structural characteristics of the dust cake, such as porosity, in relation to the pressure drop evolution is a subject of interest to improve the filtration process. This paper focuses on the study of dust cake compaction and its influence on cake porosity. A semi-empirical model based on Kozeny-Carman equation has been applied to experimental data from the operation of four types of commercial filters (two bag filters and two rigid filters) in a hot gas filtration experimental facility. The method proposed calculates the cake porosity from the specific dust cake resistance coefficient and dust properties. Cake porosity values obtained have been analysed to determine the effect of the operating parameters (filtration velocity, temperature and filtering media). Results show that filtration velocity is the variable that most affects the dust cake porosity. In addition, a correlation between filtration velocity and dust cake porosity has been established.

Keywords: cake dust porosity, hot gas filtration, ceramic filters, bag filters.

1. Introduction

Considerable work has been undertaken worldwide over the last years in the area of gas filtration, particularly under high temperature conditions that is crucial for the establishment of coal-based advanced