

Development of High Performance Filtration System for Hot Gas Cleaning

メタデータ	言語: jpn 出版者: 公開日: 2022-05-26 キーワード (Ja): キーワード (En): 作成者: Kanaoka, Chikao メールアドレス: 所属:
URL	https://doi.org/10.24517/00066092

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1997 Fiscal Year Final Research Report Summary

Development of High Performance Filtration System for Hot Gas Cleaning

Research Project

Project/Area Number

08558064

Research Category

Grant-in-Aid for Scientific Research (A)

Allocation Type

Single-year Grants

Section

展開研究

Research Field

環境保全

Research Institution

Kanazawa University

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Project Period (FY)

1996 - 1997

Keywords

Hot Gas Cleaning / Ceramic Filter / IGCC / PFBC / Incineration / Energy Saving

Research Abstract

As filtration goes on, dusts are collected on a ceramic filter element and form a dust cake layer on it. The filtration conditions and particle properties affect the accumulated amount and its shape on the element. Once dust cake is formed, the appearance of the filter changes and thus the flow around it also changes. This means that both flow field and the shape of dust layer interact with each other and they change with time, i.e., filtration performance changes with time. To elucidate the change in the flow around the filter element and accumulation process with time, a new analysis method has been proposed. Its capability has been demonstrated by solving them at filtration velocity of 5 Ncm/s varying gas temperature from 293 to 1123 K, pressure from 1 to 10 atmosphere and packing from 0.03 and 0.12.

As a result, it is found that dust cake forms a non-uniform layer on the element at any filtration condition, i.e., the maximum deposition appears at the front of the element and the minimum is observed around 120-150 degree from the front. It shifts forward as temperature rises but backward as pressure rises. With the increasing pressure, temperature and packing density, the uniformity of the dust layer increases. Suction velocity to the element, i.e., filtration velocity, decreases with time because of the increase in the resistance due to the accumulated dust. This also results in the suppression of accumulation rate of dust on the element with time. This effect is significant at high pressure and high temperature. Furthermore, pressure drop across the element increases non-linearly with time and it shows higher drops when temperature and pressure are high.

Research Products (8 results)

All Other

All Publications (8 results)

- [Publications] 金岡 千嘉男 他2名: "CLEANING OF DUST FROM PULSE JET BAG FILTER" '96CHINA-JAPAN SYMPOSIUM ON PARTICULOLOGY. 104-108 (1996) ▼
- [Publications] 金岡 千嘉男 他2名: "ACCUMULATION AND RELEASE OF DUST FROM RIGID CERAMIC FILTER ELEMENT" 3rd International Symposium on Gas Cleaning at High Temperatures. 183-192 (1996) ▼
- [Publications] 金岡 千嘉男 他1名: "ANALYSIS OF HOT GAS FILTRATION BY RIGID CERAMIC CANDLE TYPE FILTER AND DUST RELEASE MECHANISM" THE FOURTH JAPAN-KOREA SYMPOSIUM ON SEPARATION TECHNOLOGY 1996. 725-728 (1996) ▼
- [Publications] 金岡 千嘉男 他2名: "セラミックフィルタのダスト堆積分布の検討" 粉体工学会1997年秋期研究発表会講演論文集. 177-181 (1997) ▼
- [Publications] C.Kanaoka, T.Kishima and M.Furuuchi: "Cleaning of Dust from Pulse Jet Bag Filter" '96 China-Japan Symposium on Particology, Beijing, China. 104-108 (1996) ▼
- [Publications] C.Kanaoka, T.Kishima and M.Furuuchi: "Accumulation and Release of Dust from Rigid Ceramic Filter Element" Third International Symposium and Exhibition on Gas Cleaning at High Temperature. 183-192 (1996) ▼
- [Publications] C.Kanaoka, T.Kishima: "Analysis of Hot Gas Filtration by Rigid Ceramic Candle Type Filter and Dust Release Mechanism" The Fourth Japan-Korea Symposium on Separation Technology. 725-728 (1996) ▼
- [Publications] C.Kanaoka, T.Kishima: "Mana Amornkitbamrung, Thickness Distribution of Dust cake on a Candle Type Ceramic Filter" 1997 Autumn Meeting of Soc.Powder Technol., Japan. 177-180 (1997) ▼

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-08558064/085580641997kenkyu_seika_hokoku_

Published: 1999-03-15