Study on the classification of nano-size fine particles in ultarasonic flow field

1996 Fiscal Year Final Research Report Summary

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Research Project

Project/Area Number

07455434

Research Category

Grant-in-Aid for Scientific Research (B)

Allocation Type

Single-year Grants

Section

一般

Research Field

反応・分離工学

Research Institution

KANAZAWA UNIVERSITY

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1995 – 1996

Keywords

Supersonic flow / Laval nozzle / Ultrafine particle / inertial separation / Classification

Research Abstract

In this research, followings were studied to develope a novel scheme classifying nano-size ultrafine particle in an ultrasonic flow field.
1)Numerical analysises of supersonic flow field around an obstracle with openning and its classification characteristics ; The flow field around an obstacle with different shape and size of openning has been calculated for various combinations of Mach number and suction flow rate and gaps between nozzle outlet and obstacle taking account of conservations of mass, momentum and energy, simultaneously. Then their separation efficiency of particles has been obtained. As a result, shape of standing shock wave around an obstacle was found to be similar for small sucktion flow rate and thus it can be expected to obtain similar characteristics for the case of obstacle without openning.
2)Separation efficiency of four ultrasonic impactor with same nozzle outlet width of 4mm but different shapes and different gap distances using monodisperse Stannous Bromide particles ranging 20 to 1000nm. Test particles were first generated in polydisperse state by evaporation and condensation method, and then classified to monodisperse particles by a differential electric mobility analyzer. Stability of inlet and outlet particle concentrations have been monitored by a light scattering dust counter purchased by this grant. Coarse and fine fractions of test particles were determined quantitatively by a liquid ion chromalography.
3)Experimentally obtained separation efficiency curve increase very steeply and they separate much smaller and sharper cut performance than a conventional impactor. However, separation performance was found to depend strongly on the nozzle shape and gap between nozzle outlet and obstacle. Fanally it was summarized by using modified Stokes number taking account of those effects simultaneously.

Research Products (2 results)

All | Other

All | Publications (2 results)

[Publications] C. Kanaoka et al: "INERTIAL SEPARATION OF NANO-SIZE PARTICLES FROM SUPERSONIC FLOW FIELD" J. Aerosol Sci.27・7. s623-s624 (1996)

[Publications] Chikao Kanaoka and Masami Furuuchi: "Inertial separation of nano-size particles from supersonic flow field" Journal of Aerosol Science. vol.27, No.7. s263-s624 (1996)

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