

Simple Trimodal Monodisperse Model for Evolution of Multicomponent Aerosol

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Abstract

A simple trimodal monodisperse model was proposed to estimate the evolution of the multicomponent aerosol dynamics. The present model gave good agreement with experimental results and detailed numerical models but the computational load of the present model was very low compared with detailed numerical models.

1. Introduction

In the present paper, a simple trimodal monodisperse model is proposed to calculate gas to particle conversion multicomponent aerosol without the heavy computational load. And the present model is applied to toxic metal capture by sorbent. By comparing with more detailed methods, such as NGDE (Nodal General Dynamic Equation) and discrete sectional methods, the accuracy is evaluated.

2. Results

As shown in Fig. 1, the present trimodal monodisperse model consist of two fixed mode and one moving mode for each component. The two fixed mode represent monomer mode and nucleation mode and moving mode describes the accumulation mode. Fig. 2 shows the general m -component model. Using the present model, single component aerosol dynamics was solved and compared with NGDE method for the aluminum synthesis as shown in Fig. 3. Fig. 4 shows the comparison between the present model and discrete-sectional model and experimental results for the toxic metal capture by silica sorbent. As shown in result figures, the present model well agree with detailed numerical model and experimental data. The computational load of the present model is almost same with monodisperse model.

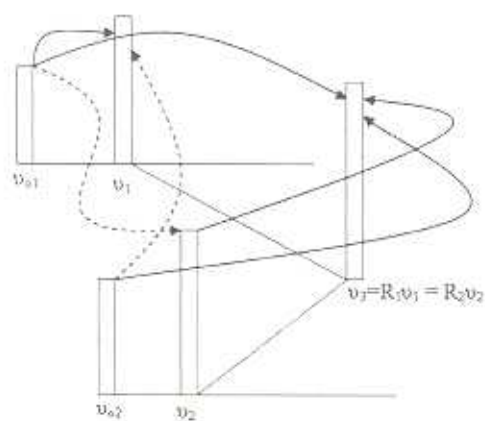


Fig. 412 Two component system

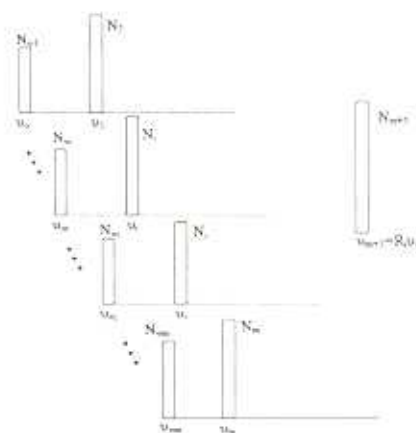


Fig. 413 General m-component system

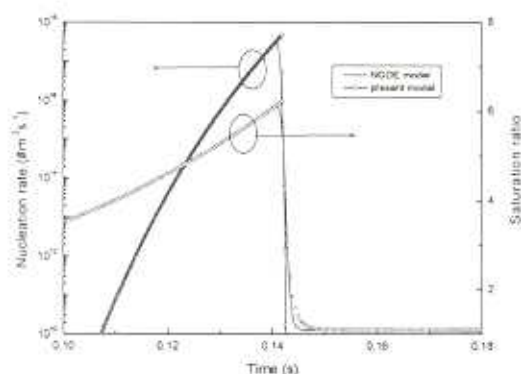


Fig. 3 Comparison between NGDE and present method

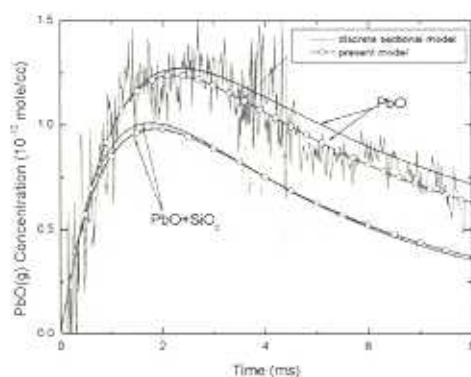


Fig. 4 Comparison between experimental and numerical results.

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References

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