CHAPTER VI

CONCLUSIONS AND RECOMMENDATION

In this study, the parameters e_N and e'_N of the deterministic model was estimated from the stochastic results under the same filtration conditions for the case of convective diffusion and inertial impaction mechanisms. Furthermore, the effects of the parameters e_N and e'_N, and the dimensionless groups on the behavior of the model were investigated. The conclusions are as follows:

1. The typical configuration of dendrites and the collection efficiency raising factor λ obtained from the present stochastic simulations agreed well with those published earlier (Kanaoka et al., 1980, 1983) for the case of convective diffusion and inertial impaction mechanisms.

2. The clean fiber collection efficiencies predicted using the limiting trajectory theory and Stechkina's equation (Stechkina et al., 1969) for inertial impaction were quite different especially at $St>>1$.

3. The dendritic distribution predicted by the present deterministic model agree quite well at a small R and fairly well at a large R with the stochastic results for both the convective diffusion and inertial impaction.

4. The collection efficiency raising factor was characterized by the dimensionless groups R, Pe and St. Its values predicted by the present model agreed well with the stochastic results for both the convective diffusion and inertial impaction. Moreover, the collection efficiency raising factor and the clean fiber collection efficiency agreed fairly well with the previous experimental results (Kimura et al., 1964; Yoshioka et al., 1969; Myojo et al., 1984) for inertial impaction.

5. Like the collection efficiency raising factor, the optimal values of the parameters e_N and e'_N were characterized by R and Pe for convective diffusion, and by R and St for inertial impaction.

6. The clean fiber collection efficiency and the collection efficiency raising factor were related graphically to the particle size and air velocity.

7. The limitation of the model is that it cannot show the individual configuration of each dendrite nor its location on the fiber surface. Therefore, the results cannot accurately predict the pressure drop of an air fibrous filter under dust loads.

8. However, the present deterministic model can predict the dendritic growth process and the collection efficiency in good agreement with the stochastic and experimental results though it requires much less computer memory and much shorter computational time than the stochastic model.

Recommendation

In this study, the deterministic model has been applied only to the case of convective diffusional and inertial impactional deposition. The author recomends the extension of the model as follows:

1. Extension to the dendritic growth for other collection mechanisms such as gravitational settling,and electrostatic.

2. The phenomena of dendritic growth at R=0.05 appeared different from those at R>0.05. Hence the phenomena of dendritic growth should also be investigated at R<0.05.