**Abstract**

The objective of this work is to find the flow and particle deposition patterns in model lung airways. The model has five generations and with 90 degrees non-planar structure with bifurcation angles ranging from 40 to 70 degrees. For ultrafine particles, the local airflow velocity is the dominant factor affecting the local deposition of the particles on the wall, while the particle size and particle mass flow rate have only minor effect.

The airflow field is obtained by solving three-dimensional Navier - Stokes equation with standard k-e turbulent model and standard wall function. The trajectories of the solid particles are predicted by integrating the force balance on the particles, which is written in a Lagrangian reference frame. A two way coupled, stochastic model is used to model the influence of turbulence on particle trajectories. A segregated, implicit, steady and three dimension solver is used for the simulations. The Power Law method is used to discrete the transport equations.