

## **Modeling Particle Loading in Fibrous Filter Media**

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### **Abstract**

Effects of particle loading on pressure drop and collection efficiency of fibrous filters are simulated in this work. Simplified 3-D geometries in which fibers are arranged in staggered configurations are considered to model the flow of air and particles through fibrous filters. Additional C++ subroutines are developed to simulate particle deposition on the fibers and previously deposited particles using the Fluent CFD code. Lagrangian method is used to calculate the trajectory of particles in a diameter range of 20 to 1000 nm, and the shape of the depositions is qualitatively compared with experimental observations from the literature. The rates of change of pressure drop and collection efficiency with time are obtained from our simulations, and discussed with respect to the available experimental data. This work builds a framework for our future simulations to be conducted in more realistic 3-D geometries made up of fibers with different diameters and orientations.

### **Bio Sketch**

S. A. Hosseini is a Mechanical Engineering PhD student in Virginia Commonwealth University. He obtained his MS (2007) and BS (2005) from Sharif University and Tehran University in Iran, respectively.

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