

Modeling Particle Filtration in 3-D Electrospun Nanofibrous Filters

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Abstract

Lagrangian and Eulerian methods are considered in this work to simulate the flow and capture of aerosol particles in 3-D fibrous media that mimic the microstructure of electrospun nanofiber mats. Stokes flow equations are numerically solved for the air flow in the voids between fibers using the Fluent CFD code. Particle collection due to interception and Brownian diffusion, as well as the slip effect at the surface of nanofibers, has been incorporated in the CFD calculations by developing customized C++ subroutines that run in the Fluent environment. Influence of slip effect on the media's collection efficiency and pressure drop are discussed and compared with experimental data from the literature.

Bio Sketch

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