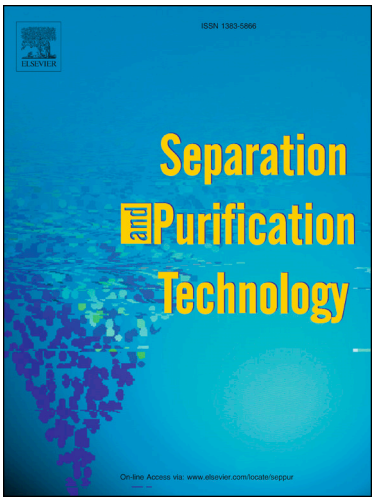

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Air-borne particle capture by fibrous filter media under collision effect: A CFD-based approach

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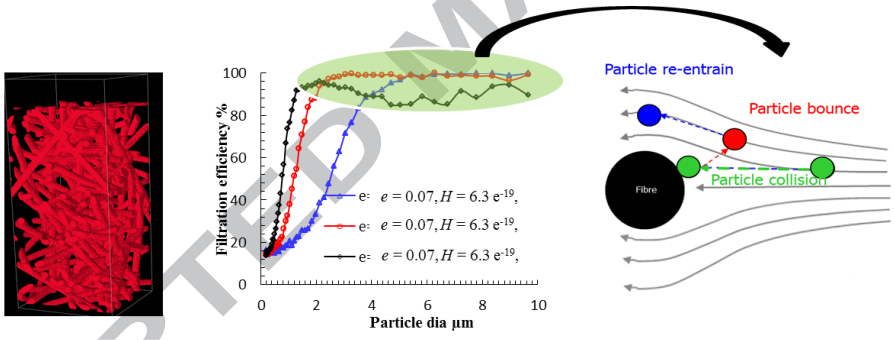
Highlights

- Particle-fiber collision models were considered to simulate aerosol filtration.
- Filtration efficiency reduced due to particle bounce followed by re-entrainment.
- Higher velocity, larger particle diameter and higher porosity were key determinants.



Virtual Fibrous structure | Particle filtration behaviour | Schematic of particle bounce after re-entrainment

Abstract

This article presents a numerical methodology for capturing air-borne particles by fibrous filter media under collision effect. It reports on the effects of collision and adhesion parameters on particle bounce and re-entrainment phenomena. Hamaker adhesion model in conjunction with particle rebound parameter was assessed for particle capture efficiency and validated with analytical and experimental data. The numerical results were found to be in good agreement with the experimental data. The roles of particle