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State of the Art of Gas Phase Filtration Modeling – Broader View

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This presentation reviews our past and current research on developing microscale (fiber-level) and macroscale (media-level) models for aerosol filtration. The presentation starts by discussing ways to create a realistic three-dimensional model of a filter's internal microstructure, and continues by showing how that geometry can be used as a simulation domain to study effects of fiber diameter or fiber orientation on collection efficiency and pressure drop of a filter. The concept of macroscale modeling will also be introduced in the context of aerosol filtration, and its pros and cons will be discussed. Moving forward to the more challenging, and intellectually more interesting, case of droplet–gas or droplet–liquid filtration, our recent studies on droplet– fiber detachment will be reviewed in the context of coalescence filtration.