Abstract Submitted
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Modeling branching pore structures in membrane filters[1] PEJMAN SANAEI, LINDA J. CUMMINGS, New Jersey Inst of Tech — Membrane filters are in widespread industrial use, and mathematical models to predict their efficacy are potentially very useful, as such models can suggest design modifications to improve filter performance and lifetime. Many models have been proposed to describe particle capture by membrane filters and the associated fluid dynamics, but most such models are based on a very simple structure in which the pores of the membrane are assumed to be simple circularly-cylindrical tubes spanning the depth of the membrane. Real membranes used in applications usually have much more complex geometry, with interconnected pores which may branch and bifurcate. Pores are also typically larger on the upstream side of the membrane than on the downstream side. We present an idealized mathematical model, in which a membrane consists of a series of bifurcating pores, which decrease in size as the membrane is traversed. Feed solution is forced through the membrane by applied pressure, and particles are removed from the feed either by sieving, or by particle adsorption within pores (which shrinks them). Thus the membrane's permeability decreases as the filtration progresses, ultimately falling to zero. We discuss how filtration efficiency depends on the characteristics of the branching structure.

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