

Abstract Submitted
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Simplified model for fouling of a pleated membrane filter¹ PEJMAN SANAEI, LINDA CUMMINGS, New Jersey Inst of Tech — Pleated filter cartridge are widely used to remove undesired impurities from a fluid. A filter membrane is sandwiched between porous support layers, then pleated and packed in to an annular cylindrical cartridge. Although this arrangement offers a high ratio of surface filtration area to volume, the filter performance (measured, e.g., by graph of total flux versus throughput for a given pressure drop), is not as good as a flat filter membrane. The reasons for this difference in performance are currently unclear, but likely factors include the additional resistance of the porous support layers upstream and downstream of the membrane, the pleat packing density (PPD) and possible damage to the membrane during the pleating process. To investigate this, we propose a simplified mathematical model of the filtration within a single pleat. We consider the fluid dynamics through the membrane and support layers, and propose a model by which the pores of the membrane become fouled (i) by particles smaller than the membrane pore size ; and (ii) by particles larger than the pores. We present some simulations of our model, investigating how flow and fouling differ between not only flat and pleated membranes, but also for support layers of different permeability profiles.

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