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Growth of clogs in microchannels EMILIE DRESSAIRE, NYU Polytechnic School of Engineering, ALBAN SAURET, SVI laboratory and Princeton University , EMMANUEL VILLERMAUX, Aix Marseille Université, IRPHE, Marseille, France, HOWARD A. STONE, Princeton University — Porous membranes are used to detect and remove contaminants suspended in a fluid phase, e.g. to filter water. A typical filtration membrane allows the fluid to pass through but traps contaminants. Once a clog is formed in a pore, incoming particles aggregate upstream. This aggregate grows over time, which leads to a dramatic reduction of the flow rate. We consider a model that predicts the growth of the colloidal aggregate formed upon clogging of a microchannel. We present an analytical description to capture the time-evolution of the volume of the aggregate. We then focus on multiple parallel channels to model membrane filtration. In this situation, the growth dynamics of the aggregates are intrinsically coupled. The results of this modeling are compared with experimental data. Our work illustrates the critical influence of clogging events on the flow rate of porous membranes used in practical applications.

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