

# Flow rate through microfilters: Influence of the pore size distribution, hydrodynamic interactions, wall slip, and inertia

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## Abstract

We examine the fluid mechanics of viscous flow through filters consisting of perforated thin plates. We classify the effects that contribute to the hydraulic resistance of the filter. Classical analyses assume a single pore size and account only for filter thickness. We extend these results to obtain an analytical formula for the pressure drop across the microfilter versus the flow rate that accounts for the non-uniform distribution of pore sizes, the hydrodynamic interactions between the pores given their layout pattern, and wall slip. Further, we discuss inertial effects and their order of scaling. © 2014 AIP Publishing LLC.

<http://dx.doi.org/10.1063/1.4876937>

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