Most wastewater management facilities aimed at water purification in the United States utilize hollow-fiber microfiltration. In these systems, pipes are split into thousands of micrometer-scale capped tubes with permeable walls. As wastewater flows through the filter, foulants are captured by the membraned walls allowing clean water to exit. Understanding the fluid dynamics is a fundamental step towards controlling the fouling process and enhancing the efficiency of microfiltration.

We investigate the flow of wastewater through a single hollow-fiber tube. Starting from an infinite channel with permeable walls, we solve the Stokes flow problem in the channel interior for all permeability regimes. Then, we generalize the result to a semi-infinite channel with permeable walls capped at one end to mimic a single hollow-fiber system. Comparison with experiments and future directions will be discussed. (Received September 16, 2019)