

Abstract Submitted
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Filter Flows at Low Reynolds Number¹ ANDERS ANDERSEN, Department of Physics and Centre for Ocean Life, Technical University of Denmark — Filter feeders that create flows through fibrous structures to capture prey particles are common among the plankton. Often the filter is external to the organism, and depending on the filter permeability and the overall motion of fluid and filter, the flow may or may not circumvent the filter. To capture small prey particles it may be advantageous to have small spacing between the filter elements, but at the same time, small filter spacing corresponds to low permeability and may result in filter circumvention and low flow rate through the filter. To explore this trade-off, we focus on low Reynolds number flow perpendicular to a thin, circular filter (permeable disk), and we determine an analytical solution for the flow through and around the filter. We compare the solution with the well-known solution for the flow past an impermeable disk, and we determine the dependence of the flow rate through the filter on its permeability and size. Finally, we discuss the possible biological implications of the results for planktonic organisms.

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