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Electroosmotic access resistance of a nanopore[1] SANDIP GHOSAL, Northwestern University, JOHN D. SHERWOOD, Cambridge University, MAO MAO, Northwestern University — Electroosmotic flow through a nanopore that traverses a dielectric membrane with a fixed surface charge density is considered. In the limit where the surface charge is small and the applied electric field weak, the reciprocal theorem is used to derive an expression for the electroosmotic flux through the pore up to quadratures over the fluid volume. Thus, an "electroosmotic conductance" (the fluid flux per unit applied voltage) may be defined in analogy to the corresponding electrical conductance of a hole in an insulating membrane immersed in a uniform conductor. In the limit when the membrane is thick compared to the pore diameter, the usual result for the electroosmotic conductance through long cylindrical channels (which varies inversely as the membrane thickness) is recovered. The electroosmotic conductance is shown to approach a finite value for an infinitely thin membrane: this residual electroosmotic resistance (inverse of conductance) is analogous to the concept of "access resistance of a pore" in the corresponding electrical problem. The dependence of the electroosmotic conductance on pore radius, Debye length and membrane thickness is investigated.

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