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Mathematical Modeling of Electroosmotic Flow in Micro/Nanonozzles[1] PRADEEP GNANAPRAKASAM, A.T. CONLISK, XIN HU, L.J. LEE, The Ohio State University — Electroosmotic flow in micro/nano nozzles is important in many applications for example in patch clamps for studying ion channel currents. Nanonozzles are also manufactured from micronozzles by a process in which a solution is pumped into a micro-nozzle electroosmotically to deposit a material from the solution on the inner walls of the channel, thus reducing the dimension of the channel to the nano-scale ranges. A mathematical model is developed for electroosmotic flow in a micro/nano nozzle. The flow through the nanonozzle is calculated first using the lubrication approximation and those results are compared with a full two dimensional steady simulation. The velocity field is composed of an electroosmotic component and a pressure driven component. The pressure gradient is set up by the electroosmotic driving force coupled with the converging/diverging channel profile. Results for the concentration distribution, velocity and potential distribution in the nanonozzle are presented.

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