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**The Effect of Electrical Double Layer On Nano-Flows** HENG BAN, BOCHUAN LIN, BARTON SMITH, Utah State University, Mechanical and Aerospace Engineering — The effect of electrical double layer (EDL) on micro-flows has been studied widely. When the channel width or tube diameter are much greater than the thickness of EDL, the electrical conductivity of the fluid can be assumed constant and the bulk electrical conductivity is often used in calculations. For channel or tube size similar to the EDL thickness, for instance, a fraction of one micron, the effect of overlapping EDL on fluid electrical conductivity needs to be included in the analysis. This paper presents an asymptotic analysis of the effect of overlapping EDL on the pressure-driven channel flow. The governing equations for the flow, the Poisson equation for the electric potential, and the charge continuity equation for the net charge were solved analytically. The effect of overlapping EDL on the electrical conductivity and velocity distribution in the micro-channel and the pressure drop were determined. The results showed that, the average electrical conductivity of electrolyte inside the channel increased significantly. As a consequence, the pressure drop for the pressure-driven flow was smaller than that without considering the influence of EDL on conductivity.

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