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Electro-viscous effect on Heat Transfer in Ionic Fluid Flow in Microchannels ABHISHEK JAIN, Department of Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, New York — Electro-viscous effect, generated due to electrolytic or ionic flow plays a critical role in enhancing the heat transfer in microchannels. Fundamental understanding of electrokinetic behavior and its effect on heat transfer is important for the design and control of microfluidics and lab-on-chip devices. In the present paper an analytic modeling of electrolytic flow in parallel plate microchannel is done. The electrolyte considered is KCl. The Navier-Stokes equations have been modified to take into account the electro-viscous effect. The effect of electro-viscous phenomenon on the boundary layer development is discussed using analytical solutions. A rapid formation of the boundary layer indicates the existence of electro-viscous effect. The expressions for velocity profile in developing and the developed flow regimes were derived and compared to those with and without the electro-viscous effect. The equations for fully developed friction factor and Nusselt number for constant wall heat flux condition have been developed and the results are interpreted in the physical domain.

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