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Electroosmotic Entry Flow with Joule Heating Effects. RAMA PRABHAKARAN, AKSHAY KALE, XIANGCHUN XUAN, Clemson University — Electrokinetic flow, which transports liquids by electroosmosis and samples by electrophoresis, is the transport method of choice in microfluidic chips over traditional pressure-driven flows. Studies on electrokinetic flows have so far been almost entirely limited to inside microchannels. Very little work has been done on the electroosmotic fluid entry from a reservoir to a microchannel, which is the origin of all fluid and sample motions in microchips. We demonstrate in this talk that strong vortices of opposite circulating directions can be generated in electroosmotic entry flows. We also develop a two-dimensional depth-averaged numerical model of the entire microchip to predict and understand the fluid temperature and flow fields at the reservoir-microchannel junction.

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