Simultaneous estimation of zeta potential and slip coefficient in hydrophobic microchannels

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Electroosmotic flows through hydrophobic microchannels experience velocity slip at the channel wall, which increases the volumetric flow rate at a given electric potential gradient. The conventional method of zeta potential estimation using the volumetric flow rate may yield quite inaccurate zeta potential unless the velocity slip is appropriately taken care of. In the present investigation we develop a method for simultaneous estimation of zeta potential and velocity slip coefficient in the electroosmotic flow through a hydrophobic microchannel using velocity measurements. The relevant inverse problem is solved through the minimization of a performance function utilizing a conjugate gradient method. The present method is found to estimate the zeta potential and slip coefficient accurately even with noisy velocity measurements.