

Oscillatory Electroosmotic Flow in a Microchannel with Slippage at the Walls and Asymmetric Wall Zeta Potentials

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Abstract : In this work, we conduct a theoretical analysis of an oscillatory electroosmotic flow in a parallel-plate microchannel taking into account slippage at the microchannel walls. The governing equations given by the Poisson-Boltzmann (with the Debye-Huckel approximation) and momentum equations are nondimensionalized from which four dimensionless parameters appear; a Reynolds angular number, the ratio between the zeta potentials of the microchannel walls, the electrokinetic parameter and the dimensionless slip length which measures the competition between the Navier slip length and the half height microchannel. The principal results indicate that the slippage has a strong influence on the magnitude of the oscillatory electroosmotic flow increasing the velocity magnitude up to 50% for the numerical values used in this work.

Keywords : electroosmotic flows, oscillatory flow, slippage, microchannel

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