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Nonlinear studies of AC electrokinetic micropumps HENRIK BRUUS, LAURITS H. OLESEN, Technical University of Denmark, ARMAND AJDARI, Ecole Superieure de Physique et de Chimie Industrielles — Recent experiments have demonstrated that AC electrokinetic micropumps permit integrable, local, and fast pumping (velocities $\sim$ mm/s) with low driving voltage of a few volts only. However, they also displayed many quantitative and qualitative discrepancies with existing theories. We therefore extend the latter theories to account for three experimentally relevant effects: (*i*) vertical confinement of the pumping channel, (*ii*) Faradaic currents from electrochemical reactions at the electrodes, and (*iii*) nonlinear surface capacitance of the Debye layer. We report here that these effects indeed affect the pump performance in a way that we can rationalize by physical arguments.

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