Lattice Boltzmann models in microchannel flows

We present a mesoscopic model of the fluid-wall interactions for flows in microchannel geometries. We define a suitable implementation of the boundary conditions for a discrete version of the Boltzmann equations describing a wall-bounded single phase fluid. We distinguish different slippage properties on the surface by introducing a slip function, defining the local degree of slip for hydrodynamical fields at the boundaries. The slip function plays the role of a *renormalizing* factor which incorporates, with some degree of arbitrariness, the microscopic effects on the mesoscopic description. We discuss the mesoscopic slip properties in terms of slip length, slip velocity, pressure drop reduction (drag reduction), and mass flow rate in microchannels as a function of the degree of slippage and of its spatial distribution and localization.