

Analysis and synthesis of lattice Boltzmann boundary conditions

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A direct asymptotic analysis is carried out for the Lattice Boltzmann method with boundary conditions. We recover the governing PDEs, and show the accuracy and consistency of two boundary conditions: the bounce back rule and the Bouzidi rule. Based on the higher order terms in the boundary analysis, a correction to the bounce back rule is constructed, a new method obtaining second order accuracy in both velocity and pressure is proposed. The theoretical results are supported by numerical convergence studies.