

“Magic parameters” revisited *

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In a seminal paper [4] Ginzburg and Adler analyzed the bounce back boundary conditions and showed that it could be made exact to second order relatively Δx (*i.e.* for the Poiseuille flow) if some expression depending on the parameters of the lattice Boltzmann model were satisfied. Thus defining so called “magic parameters” [6]. At the occasion of the ICMMES 2007 Conference, we presented so-called “magic” parameters to enforce fourth order accuracy of equivalent equations. We denote now them as “quartic” parameters [3].

Using the equivalent equation method that one of us developed [1][2], we analyze in this contribution a series of situations (1D, 2D) for diffusion problems by anti-bounce back and for linear fluid problems by bounce back method for taking into account boundary conditions. The result is that “magic” parameters depend on the detailed choice of the moments [5] and on their equilibrium value. Moreover, a “quartic” parameter may or may not be a “magic” one for the analysis of the precision of the boundary conditions.

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