Erratum: Modified lattice Boltzmann model for axisymmetric flows [Phys. Rev. E 75, 056703 (2007)]

Article *in* Physical review. E, Statistical physics, plasmas, fluids, and related interdisciplinary topics · November 2007

DOI: 10.1103/PhysRevE.76.059902

Timothy N Phillips
Cardiff University

Erratum: Modified lattice Boltzmann model for axisymmetric flows [Phys. Rev. E 75, 056703 (2007)]

T. Reis and T. N. Phillips

(Received 8 October 2007; published 2 November 2007)

DOI: 10.1103/PhysRevE.76.059902 PACS number(s): 47.11.−j, 99.10.Cd

After substitution of the expression for the momentum flux tensor, the momentum equation (41) should read

$$\rho(\partial_t u_\alpha + u_\beta \partial_\beta u_\alpha) + \partial_\alpha P - \rho\nu\partial_\beta\partial_\beta u_\alpha = \sum_{i=0}^{8} S_i^{(2)} c_{i\alpha} - 2\nu\partial_\alpha \frac{\rho u_y}{y} + \frac{1}{3\omega}\partial_\alpha \frac{\rho u_y}{y} + u_\alpha \frac{\rho u_y}{y}. \tag{41}$$

This means that extra terms now appear in Eqs. (43) and (44) that provide conditions on the second-order contribution to the source term in Eq. (17). These equations should read

$$\sum_{i=0}^{8} S_i^{(2)} c_{ix} = \frac{\rho\nu}{y}(\partial_y u_x + \partial_x u_y) - \frac{\rho}{6y}\partial_x u_y - \frac{\rho u_x u_y}{y}, \tag{43}$$

$$\sum_{i=0}^{8} S_i^{(2)} c_{iy} = \frac{\rho}{y}\left(2\nu - \frac{1}{6}\right)\left(\partial_y u_y - \frac{u_y}{y}\right) - \frac{\rho u_y^2}{y}, \tag{44}$$

respectively. The correct form of the tensor $Q_{\alpha\beta}$ in Eq. (45) is

$$Q_{\alpha\beta} = -\frac{\rho}{3\omega}(\partial_\alpha u_\beta + \partial_\beta u_\alpha).$$

The correct expression for the second-order contribution to the source term is then given by

$$S_i^{(2)} = \frac{3W_i}{y}\left[\frac{c_{iy}^2}{2}\left(u_x\partial_x u_y - \frac{3u_y\omega}{2}Q_{xx} - 3u_y\omega Q_{yy} - \frac{\rho u_y^2}{y}\right) - c_{ix}\left(\frac{6\nu}{6\nu+1}Q_{xy} + \frac{\rho}{6}\partial_x u_y - \rho u_x u_y\right) + c_{iy}(1-12\nu)\left(\frac{1}{2(1+6\nu)}Q_{yy} + \frac{\rho u_y}{y} - \rho u_y^2\right)\right].$$

This should replace the very last equation in the paper.

