

# Errata for the first (October 2005) printing of “Lattice Boltzmann Modeling” by Sukop and Thorne

19 September 2007

**P 25:** In Exercise 2, the `fhp_simp4.c` file must be renamed as `fhp_simp.c` prior to compilation. The `fhp6_simp.c` in the Lgapack distribution has 4-particle collisions and has a viscosity that does not follow Equation (8).

**P 38:**

The following lines

```
uxuy5 = uxij + uyij;  
uxuy6 = -uxij + uyij;  
uxuy7 = -uxij + -uyij;  
uxuy8 = uxij + -uyij;
```

should be

```
uxuy5 = uxeqij + uyeqij;  
uxuy6 = -uxeqij + uyeqij;  
uxuy7 = -uxeqij + -yeqij;  
uxuy8 = uxeqij + -yeqij;
```

The next-to-last line of the code snippet should be

```
fij[a] = ftempij[a] - ( ftempij[a] - feqij[a])/tau;
```

**P 47:** In Equation (30),  $1/8 \rho$  should be  $1/9 \rho$  in the two places it appears.

**P 48:** In Equation (32), the last 2 lines should have  $f_6$  instead of  $f_5$  as in:

$$\rho v_0 = \frac{2}{3} \rho v_0 + 2f_6 - 2f_8 - (f_1 - f_3) \Rightarrow$$
$$f_8 = f_6 - \frac{1}{2}(f_1 - f_3) - \frac{1}{6} \rho v_0.$$

**P 49:** In the code snippet for velocity boundary conditions, both the east and west side BCs include:

```
rho0 = ( fj[0] + fj[1] + fj[3]...
```

They should be

```
rho0 = ( fj[0] + fj[2] + fj[4]...
```

**P 49 to 52:** The section on "Dirichlet (Pressure) Boundaries" cites the wrong equation numbers in the text body; the equations themselves are numbered properly. Here is a list of mappings where (N) → (N') means that the currently stated equation number (N) should instead be (N'):

- (20) → (33)
- (23) → (36)
- (22) → (35)
- (29) → (49)
- (30) → (42)

**P 52:**

Equation (42) should have  $\rho_0 v$  instead of  $\rho v_0$ .

In Equation (44), the last 2 lines should have  $f_6$  instead of  $f_5$  as in:

$$\rho_0 v = \frac{2}{3} \rho_0 v + 2f_6 - 2f_8 - (f_1 - f_3) \Rightarrow$$

$$f_8 = f_6 - \frac{1}{2}(f_1 - f_3) - \frac{1}{6} \rho_0 v.$$

The words ‘velocity’ and ‘density’ should be exchanged and the ‘e.g., equation (19)’ should be eliminated in the last paragraph. The first sentence of the summary paragraph should read:

"To summarize the procedure, we specify a density  $\rho_0$  at the boundary and solve for the macroscopic velocity normal to the boundary and the three unknown directional densities via four equations."

**P. 53:**

South BC should be:

$$\begin{aligned} u_{y0} &= +1 - (... \\ f_j[2] &= f_j[4] + (... \\ f_j[5] &= f_j[7] + (... \\ f_j[6] &= f_j[8] + (... \end{aligned}$$

West BC should be:

$$u_{x0} = +1 - (...$$

**P 105:** Equation (95) should have  $\rho_\sigma$  in the denominator instead of  $f_a^\sigma$ .

**P 115:**  $du/dt$  should be  $d\mathbf{u}/dx$

**P 141:** On the top line, the figure reference should be to Figure 73.

**P 150:** The inline formula should be  $K = kg/\nu$  instead of  $k = Kg/\nu$ .