

Effects of boundary conditions on Min-Protein Oscillation in *E. coli* using mesoscopic lattice Boltzmann method

Waipot Ngamsaad, Wannapong Triampo¹

Summary

The Min-proteins oscillation in *E. coli* has an essential role in controlling the accuracy placement of cell-division septum at the middle cell zone of the bacteria. This biochemical process has been successfully described by a set of reaction-diffusion equation at the macroscopic level [1]. Recently, a mesoscopic modeling by the lattice Boltzmann method (LBM) has been proposed to simulate the Min-proteins oscillation [2]. However, as pointed out by Zhang et al., the standard boundary conditions are not accuracy for a class of dispersion transport modeled by LBM [3]. In this present work, we investigated the boundary effects in LBM on the Min-proteins oscillation. It was found that the mirror-image method is a suitable boundary treatment for this problem. Physical significance of the results is extensively discussed.

keywords: Lattice-Boltzmann method, Boundary conditions, Min-proteins oscillation, Cell division

References

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¹R&D Group of Biological and Environmental Physics, Department of Physics, Mahidol University, Ratchathewi, Bangkok 10400, THAILAND

