

Simulate binary mixtures with a two-fluid lattice Boltzmann model

Division of Physics and Astronomy, Kyoto Univ. Aiguo Xu ¹

Abstract

Lattice Boltzmann(LB) simulations of complex fluids have been attracting extensive interest. Most of previous LB studies on binary mixtures are based on the one-fluid theory where the two components are assumed to have nearly symmetric mechanical properties. Two-fluid LB models [Europhys. Lett. 69, 214 (2005); Phys. Rev. E (in press, cond-mat/0406012)] were developed recently to simulate binary systems where the two components may have greatly different mechanical properties. We further the study by incorporating interparticle interactions so that the LB schemes can be used to investigate systems with interfacial tension. Details of the schemes and simulation results will be shown.

Acknowledgment

The author thanks Prof. G. Gonnella for guiding him into the field of LBM and complex fluids, and thanks Profs. H. Hayakawa, V. Sofonea, S. Succi for helpful discussions. This work is partially supported by Grant-in-Aids for Scientific Research (Grant No. 15540393) and for the 21-th Century COE “Center for Diversity and Universality in Physics” from the Ministry of Education, Culture and Sports, Science and Technology (MEXT) of Japan. Numerical computations in this work were partly carried out at the Yukawa Institute Computer Facility of Kyoto University.

¹E-mail: aiguo Xu@yuragi.jinkan.kyoto-u.ac.jp