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Numerical Analysis of Blood Flow in an Arteriole using Immersed Boundary Lattice Boltzmann Method[1] DONGSIK JANG, MARIE OSHIMA, Univ. Tokyo — In an arteriole with an internal diameter of 10$\sim$100μm, blood flow has a various flow characteristics such as a decrease in hematocrit, a decrease in viscosity, and axial migration of red blood cells (RBCs). These phenomena are caused by the interaction between RBCs and plasma. The conventional method such as finite difference or finite element method is difficult to track a lot of RBCs which change their shapes depending on shear of flow. In this paper, an immersed boundary lattice Boltzmann method is used to predict the behavior of RBCs in the arteriole. The RBC is assumed as a 2D circular or biconcave capsule, which has a stress-free membrane with the same perimeter in the initial condition. Deformation of capsule is caused by stretching, bending and dilatational energies. The three types of energies are calculated for each capsule in the shear flow. As a result, the total energy of circular capsule is higher than that of biconcave one. Therefore, the membrane of biconcave capsule is stiffer than that of circular one. An analysis is conducted for a channel flow in order to estimate flow resistance varying parameters such as hematocrit, Reynolds number, and the effective radius of capsule.

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Dongsik Jang
Univ. Tokyo

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