The Dissipative Particle Dynamic Simulation of Suspension in Micro-channels

Chen CC, Zhou WW*

April 28, 2018

Abstract

This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD and finite extensible nonlinear FENE based spring chains model. This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD and finite extensible nonlinear FENE based spring chains model. This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD and finite extensible nonlinear FENE based spring chains model.

1 Introduction

This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD and finite extensible nonlinear FENE based spring chains model. This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD[1, 2].

This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD.

This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD. DPD and finite extensible nonlinear FENE based spring chains model. This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD.

*Corresponding author

2 Methodology of the dissipative particle dynamics

This paper investigated the transport and conformation of macromolecules in microchannels using the dissipative particle DPD and finite extensible nonlinear FENE based spring chains model. This paper investigated the transport and conformation.

$$\frac{\mathrm{d}r_i}{\mathrm{d}t} = v_i, \qquad \frac{\mathrm{d}v_i}{\mathrm{d}t} = \sum_{j \neq i}^{N} f_{ij_i}^{ext} \tag{1}$$

Where r_i and v_i denote the position and velocity of particle i.

$$\mathrm{F}_{ij}^{C} = \begin{cases} a_{ij}(1 - r_{ij}) & r_{ij} < r_C \\ 0 & r_{ij} \geq r_C \end{cases} \tag{2}$$

3 Parameters

To construct a working DPD, we need select values of some necessary parameters. To construct a working DPD, we need select values of some necessary parameters. Table 1 listed the some model parameters that we need determined before we could sufficient.

Table 1: Model parameters

Model parameters	**Symbol**	**Value**
Mass of DPD paticle	m	unity
Simulation time step	t	unity

4 Channel flow of FENE chain suspension

We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels. We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels, which are shown in figure 1 and figure 2 respectively.

We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels.

We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels. FENE chains to model the suspension of macromolecules in three kind of micro-channels.

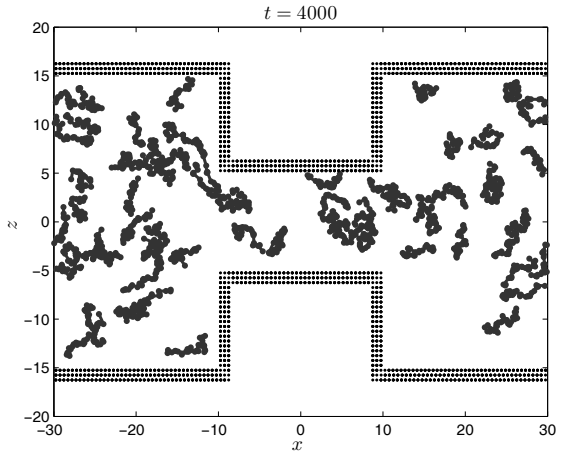

Figure 1: Quadrate contraction micro

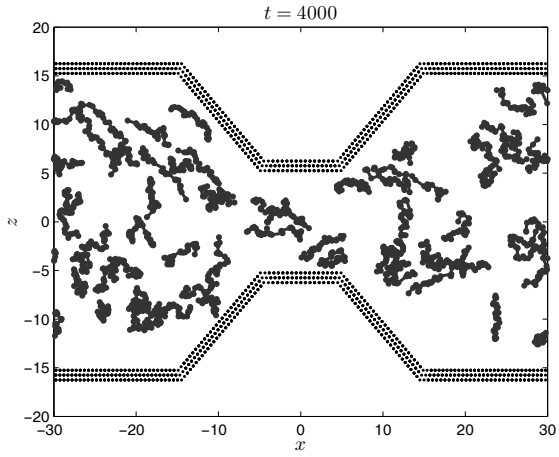

Figure 2: Sloping contraction micro

5 Conclusion

Our numerical results show that macro are mainly concentrated in the middle channel. We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels.

We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels.

Our numerical results show that macro are mainly concentrated in the middle channel. We use DPD particles and FENE chains to model the suspension of macromolecules in three kind of micro-channels.

References

[1] Kyoseok Chun, Gen Hashiguchi, and Hiroshi Fujita. Fabrication of array of hollow microcapillaries used for injection of genetic materials into animal/plant cells. *Japanese Journal of Applied Physics*, 38(38):406–411, 1999.

[2] Xijun Fan, Nhan Phanthien, Ng Teng Yong, Xuhong Wu, and Diao Xu. Microchannel flow of a macromolecular suspension. *Physics of Fluids*, 15(1):11–21, 2003.