Erratum: Kinetic theory for flows of nonhomogeneous rodlike liquid crystalline polymers with a nonlocal intermolecular potential [Phys. Rev. E 65, 051504 (2002)]

Wang Qi,[1,*] E Weinan,[2] Liu Chun,[3] and Zhang Pingwen[4]
[1]Department of Mathematics, Florida State University, Tallahassee, FL 32306
[2]Department of Mathematics, Princeton University, Princeton, NJ 0854
[3]Department of Mathematics, Pennsylvania State University, College Park, PA 1680
[4]School of Mathematical Sciences, Peking University, Beijing 100871, People's Republic of China
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We spotted some errors in Eqs. (17) and (A10), where the body force formula is presented. The correct formula for the body force should read

$$\mathbf{F}_e = -kT\langle \boldsymbol{\nabla} U_e\rangle. \tag{A10}$$

We rederive(A10) from (A6) below. We denote the kernel function by

$$K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'') = \frac{1}{2}\int_\Omega [B(\mathbf{m},\mathbf{m}',\mathbf{x}'-\mathbf{x})H(\mathbf{m}',\mathbf{x}''-\mathbf{x}') + B(\mathbf{m}',\mathbf{m},\mathbf{x}'-\mathbf{x}'')H(\mathbf{m},\mathbf{x}-\mathbf{x}')]d\mathbf{x}'.$$

From (A6), we have

$$\begin{aligned}\frac{kT}{2}\int_\Omega\int_{\|\mathbf{m}\|=1}(\delta U_e f - U_e\delta f)d\mathbf{x}d\mathbf{m} &= \frac{kT}{2}\int_{\Omega^3}\int_{\|\mathbf{m}\|=1}\int_{\|\mathbf{m}'\|=1}\left[f(\mathbf{m},\mathbf{x},t)\frac{d}{dt}[K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)]\right.\\ &\quad\left.-K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)\frac{d}{dt}f(\mathbf{m},\mathbf{x},t)\right]d\mathbf{x}d\mathbf{x}'d\mathbf{x}''d\mathbf{m}d\mathbf{m}'\,\delta t\\ &= \frac{kT}{2}\int_{\Omega^3}\int_{\|\mathbf{m}\|=1}\int_{\|\mathbf{m}'\|=1}[f(\mathbf{m},\mathbf{x},t)\mathbf{v}(\mathbf{x},t)\cdot\nabla_x K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)d\mathbf{m}'\\ &\quad - K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)\mathbf{v}(\mathbf{x},t)\cdot\nabla_x f(\mathbf{m},\mathbf{x},t)]d\mathbf{x}d\mathbf{x}'d\mathbf{x}''d\mathbf{m}d\mathbf{m}'\,\delta t\\ &= \frac{kT}{2}\int_{\Omega^3}\int_{\|\mathbf{m}\|=1}\int_{\|\mathbf{m}'\|=1}[f(\mathbf{m},\mathbf{x},t)\mathbf{v}(\mathbf{x},t)\cdot\nabla_x K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)d\mathbf{m}'\\ &\quad + \nabla_x[\mathbf{v}(\mathbf{x},t)K_e(\mathbf{m},\mathbf{m}',\mathbf{x},\mathbf{x}'')f(\mathbf{m}',\mathbf{x}'',t)]f(\mathbf{m},\mathbf{x},t)]d\mathbf{x}d\mathbf{x}'d\mathbf{x}''d\mathbf{m}d\mathbf{m}'.\end{aligned}\tag{A6}$$

Using the fact that

$$\boldsymbol{\nabla}\cdot\mathbf{v}(\mathbf{x},t)=0,$$

we arrive at

$$\mathbf{F}_e = -kT\langle \boldsymbol{\nabla} U_e\rangle. \tag{A10}$$

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*Corresponding author. Email address: wang@math.fsu.edu

