

Erratum: Effect of image forces on polyelectrolyte adsorption at a charged surface [Phys. Rev. E. 70, 051802 (2004)]

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Equation (6) is erroneous and leads to an overestimation of the effect of image forces. The correct form of that equation containing the dielectric term discontinuity Δ_ϵ reads

$$\beta U_{\text{Coul}}^{(\text{plate})}(z_i) = l_B \left[\pm 2\pi\sigma_0(1 + \Delta_\epsilon)z_i + \frac{\Delta_\epsilon}{4z_i} \right]. \quad (6)$$

It is precisely the term $(1 + \Delta_\epsilon)$ that was missing in the original paper, which physically represents the image charge contribution stemming from the charged interface itself. A simple derivation can be obtained as follows: Assume that a charged surface characterized by a surface charge density σ is located at $z = \delta > 0$ ($z = 0$ being the dielectric interface position), then its image is located at $z = -\delta < 0$ with a charge $\Delta_\epsilon\sigma$. Taking the limit $\delta \rightarrow 0$, the effective surface charge density of the interface becomes $(1 + \Delta_\epsilon)\sigma$ [1]. Doing so the total image charge of the electroneutral system (charged interface+counterions) remains also zero. Despite the error in Eq. (6) most of our conclusions remain qualitatively correct. The only conclusion that is truly affected concerns the overcharging. With our data based on the corrected Eq. (6), it is found that *overcharging is robust against image forces*. Furthermore, all our results obtained in the absence of image charges (i.e., $\Delta_\epsilon = 0$) in the original paper are evidently unaffected by this mistake.

We now briefly discuss the impact of our corrections by providing some representative corrected data. The profiles of the monomer distribution $n(z)$ can be found in Fig. 1 that corresponds to our earlier Fig. 1(b). From Fig. 1, it can be seen that the same qualitative behavior is found as that sketched in Fig. 1(b) from the original paper. The height of the peaks in Fig. 1 are roughly twice as large as those found in Fig. 1(b) in the original paper. Some data from Fig. 1 were also published elsewhere [see Fig. 3(b) in Ref. [2]].

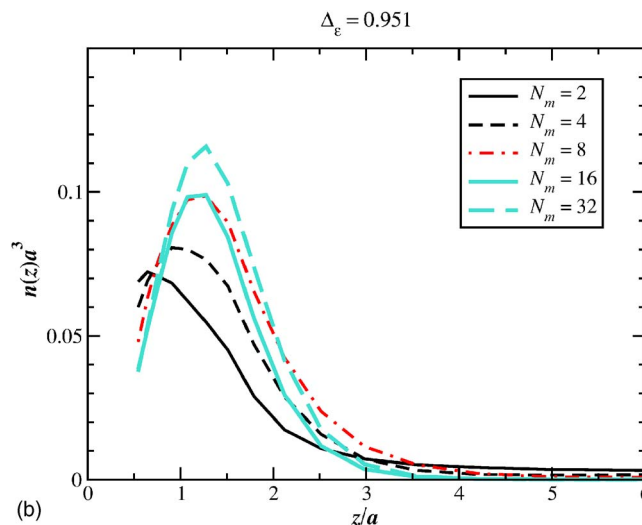


FIG. 1. (Color online) Profiles of the monomer density $n(z)$ for different chain length N_m with $\sigma_0 L^2 = 64$ and $\Delta_\epsilon = 0.951$.

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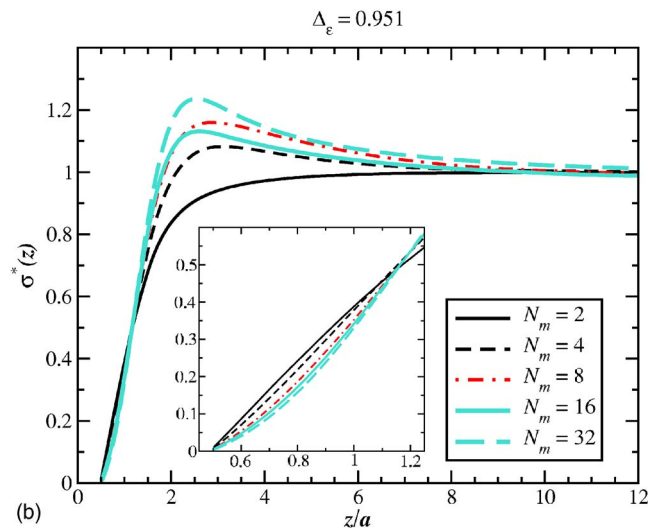


FIG. 4. (Color online) Profiles of the reduced net fluid charge $\sigma^*(z)$ for different chain length N_m with $\sigma_0 L^2 = 64$ and $\Delta_\epsilon = 0.951$. The inset is a magnification of the region near contact.

An important change concerns Fig. 4(b) in the original paper where an erroneous cancellation of overcharging was reported. The corrected data are now depicted in Fig. 4. The strength of the overcharging is presently nearly identical to that obtained without image forces at $\Delta_\epsilon = 0$ (compare with Fig. 4 in the original paper). Near contact ($z \lesssim 1.2a$) it is found that the fraction of charge $\sigma^*(z)$ (see Fig. 4), that is, essentially due to the adsorbed monomers, decreases with growing N_m . This feature was already reported in Fig. 4(b) from the original paper.

[1] Note that one obtains exactly the same effective surface charge density if we start from a charged surface located at $z = -\delta < 0$ and then take the limit $\delta \rightarrow 0$.

[2] R. Messina, J. Chem. Phys. **124**, 014705 (2006).