Erratum: Dielectrophoretic manipulation of macromolecules: The electric field [Phys. Rev. E 64, 026605 (2001)]

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In this paper, we published the electric fields and gradients in the electric field intensity produced by a parallel array of electrodes excited by a frequency dependent ac signal. Through publication of a subsequent work on quadrupolar effects 1and through interactions concerning a preprint that uses our paper, we have been made aware of typographical errors. Some of these errors resulted from the manual typesetting process and were not detected by the authors in the proof (please see [2]); as a consequence, and in an effort to make our work more useful, we provide below the original derived equations with the appropriate corrections.

The following equations have typographical errors:

(1) In the abstract $\nabla\cdot(\mathbf{E}\cdot\mathbf{E})$ should be $\nabla(\mathbf{E}\cdot\mathbf{E})$.

(2) In Eq. (1) the complex permittivity of the medium that is a prefactor to the Claussius-Mosotti factor should be just the real part of ϵ_m^* (ϵ_m), or

$$F_{\mathrm{DEP}} = 2\pi a^3 \epsilon_m K(\epsilon_p^*, \epsilon_m^*)\,\nabla\,(\mathbf{E}\cdot\mathbf{E}). \tag{1}$$

(3) Equation (6) is missing a set of parentheses and should be as follows:

$$\psi(x_1,x_3) = -\frac{1}{\pi}\sum_{j=1}^{N}\psi_e\left[\arctan\left(\frac{x_1-b_j}{x_3-x_{3_0}}\right)-\arctan\left(\frac{x_1-a_j}{x_3-x_{3_0}}\right)\right]+\frac{1}{\pi}\sum_{j=1}^{N-1}\left(-\psi_g(x_1)\left[\arctan\left(\frac{x_1-a_{j+1}}{x_3-x_{3_0}}\right)-\arctan\left(\frac{x_1-b_j}{x_3-x_{3_0}}\right)\right]\right.$$
$$\left.+\frac{C_2(x_3-x_{3_0})}{2}\left\{\ln\left[1+\left(\frac{x_1-a_{j+1}}{x_3-x_{3_0}}\right)^2\right]-\ln\left[1+\left(\frac{x_1-b_j}{x_3-x_{3_0}}\right)^2\right]\right\}\right).$$

(4) In the Appendix (A1) and (A2) appear in correct form.

(5) (A3) should be

$$\frac{\partial E_1}{\partial x_1} = \frac{2(x_3-x_{3_0})}{\pi}\sum_{j=1}^{N}\psi_e\left(\frac{x_1-a_j}{[(x_3-x_{3_0})^2+(x_1-a_j)^2]^2}-\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right)+\frac{1}{\pi}\sum_{j=1}^{N-1}\left\{2(x_3-x_{3_0})\psi_g(x_1)\right.$$
$$\times\left(\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}-\frac{x_1-a_{j+1}}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right)+2C_2\left(\frac{x_3-x_{3_0}}{(x_3-x_{3_0})^2+(x_1-a_{j+1})^2}-\frac{x_3-x_{3_0}}{(x_3-x_{3_0})^2+(x_1-b_j)^2}\right)$$
$$\left.-C_2(x_3-x_{3_0})\left[\left(\frac{(x_3-x_{3_0})^2-(x_1-a_{j+1})^2}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right)-\left(\frac{(x_3-x_{3_0})^2-(x_1-b_j)^2}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right)\right]\right\},$$

(6) (A4) should be

$$\frac{\partial E_3}{\partial x_3} = \frac{2(x_3-x_{3_0})}{\pi}\sum_{j=1}^{N}\psi_e\left(\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}-\frac{x_1-a_j}{[(x_3-x_{3_0})^2+(x_1-a_j)^2]^2}\right)+\frac{1}{\pi}\sum_{j=1}^{N-1}\left[2(x_3-x_{3_0})\psi_g(x_1)\right.$$
$$\times\left(\frac{x_1-a_{j+1}}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}-\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right)-2C_2(x_3-x_{3_0})^3\left(\frac{1}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right.$$
$$\left.\left.-\frac{1}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right)-3C_2(x_3-x_{3_0})\left(\frac{1}{(x_3-x_{3_0})^2+(x_1-a_{j+1})^2}-\frac{1}{(x_3-x_{3_0})^2+(x_1-b_j)^2}\right)\right].$$

(7) (A5) should be

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$$\frac{\partial E_3}{\partial x_1} = \frac{1}{\pi}\sum_{j=1}^{N} \psi_e\left(\frac{(x_3-x_{3_0})^2-(x_1-a_j)^2}{[(x_3-x_{3_0})^2+(x_1-a_j)^2]^2} - \frac{(x_3-x_{3_0})^2-(x_1-b_j)^2}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right) + \frac{1}{\pi}\sum_{j=1}^{N-1}\left[\psi_g(x_1)\left(\frac{(x_3-x_{3_0})^2-(x_1-b_j)^2}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2} - \frac{(x_3-x_{3_0})^2-(x_1-a_{j+1})^2}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right) + 2C_2\left(\frac{x_1-b_j}{(x_3-x_{3_0})^2+(x_1-b_j)^2} - \frac{x_1-a_{j+1}}{(x_3-x_{3_0})^2+(x_1-a_{j+1})^2}\right) - 2C_2(x_3-x_{3_0})^2\left(\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2} - \frac{x_1-a_{j+1}}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right)\right].$$

(8) And finally, (A6) should be

$$\frac{\partial E_1}{\partial x_3} = \frac{1}{\pi}\sum_{j=1}^{N} \psi_e\left(\frac{(x_3-x_{3_0})^2-(x_1-a_j)^2}{[(x_3-x_{3_0})^2+(x_1-a_j)^2]^2} - \frac{(x_3-x_{3_0})^2-(x_1-b_j)^2}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2}\right) + \frac{1}{\pi}\sum_{j=1}^{N-1}\left[\psi_g(x_1)\left(\frac{(x_3-x_{3_0})^2-(x_1-b_j)^2}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2} - \frac{(x_3-x_{3_0})^2-(x_1-a_{j+1})^2}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right) + 2C_2\left(\frac{x_1-b_j}{(x_3-x_{3_0})^2+(x_1-b_j)^2} - \frac{x_1-a_{j+1}}{(x_3-x_{3_0})^2+(x_1-a_{j+1})^2}\right) - 2C_2(x_3-x_{3_0})^2\left(\frac{x_1-b_j}{[(x_3-x_{3_0})^2+(x_1-b_j)^2]^2} - \frac{x_1-a_{j+1}}{[(x_3-x_{3_0})^2+(x_1-a_{j+1})^2]^2}\right)\right].$$

In accordance with the Swartz relationship, the cross terms, $\partial E_3/\partial x_1$ and $\partial E_1/\partial x_3$, are equivalent.

In being made aware of the slight typographical errors, the authors confirmed that the correct forms of the above equations were indeed used in the analysis presented in this paper and in Ref. [2](please see comparison with [3]).

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