PHYSICAL REVIEW E **83**, 059904(E) (2011)

Erratum: Mean square displacement analysis of single-particle trajectories with localization error: Brownian motion in an isotropic medium [Phys. Rev. E 82, 041914 (2010)]

Xavier Michalet

(Received 27 March 2011; published 11 May 2011)

DOI: 10.1103/PhysRevE.83.059904 PACS number(s): 87.16.dp, 87.80.Nj, 87.16.ad, 05.40.Jc, 99.10.Cd

I. Erratum

Two typographic errors were discovered in Eqs. (8) and (28) of [1]. The correct equations are as follows:

$$\bar{\rho}'_n = \frac{1}{E(N/n)} \sum_{i=1}^{E(N/n)} (\vec{r}_{in+1} - \vec{r}_{(i-1)n+1})^2, \;\; n = 1, \ldots, N-1, \tag{8}$$

and

$$\begin{aligned} \sigma_{nm}^2 &= \frac{n}{6KP}\{4n^2K + 2K - n^3 + n + (m-n)(6nP - 4n^2 - 2)\}\alpha^2 + \frac{1}{K}\left[2n\alpha\varepsilon + \left(1 - \frac{n}{2P}\right)\varepsilon^2\right], \;\; m+n \leqslant N, \\ &= \frac{1}{6K}\{6n^2K - 4nK^2 + K^3 + 4n - K + (m-n)[(n+m)(2K+P) + 2nP - 3K^2 + 1]\}\alpha^2 \\ &\quad + \frac{1}{K}\left(2n\alpha\varepsilon + \frac{\varepsilon^2}{2}\right), \;\; m+n > N. \end{aligned} \tag{28}$$

Note that only the last term of the case $m + n \leqslant N$ is modified.

None of these corrections affect the results of this work. However, since some of the graphs were calculated using the incorrect Eq. (28), we provide the corrected Figs. 4–8 for reference. Note that the changes compared to the original figures are minimal but it is noteworthy that comparison between theory and simulation is better [Figs. 4(c) and 4(d) and Figs. 6(c) and 6(d)].

Finally, to take these changes into account, the heuristic formula (30) needs to be slightly modified into the new Eq. (30):

$$p_{\min} = E(2 + 2.3x^{0.52}). \tag{30}$$

The supporting information file containing several appendices and supporting figures was also modified to reflect those changes as follows:

– Corrected Eq. (F.12)–(F.13) and following discussion.
– Appendix G (C-code).
– Fig. S2–S3, S13–S14.

I would like to thank A. J. Berglund for pointing out the two typographic errors in Eqs. (8) and (28).

[1] X. Michalet, Phys. Rev. E **82**, 041914 (2010).

*michalet@chem.ucla.edu

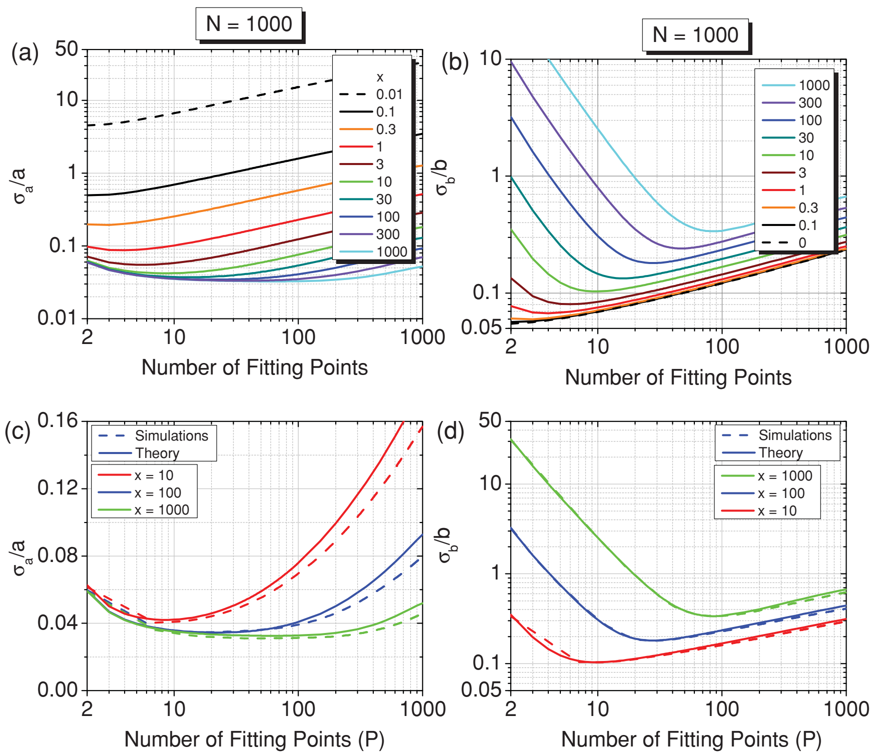

FIG. 4. (Color online) Relative error on fitted parameters (weighted fit, $N = 1000$ points), Eq. F.17 and F.19. Evolution of the relative errors on fitted parameters ((a): intercept a, (b): slope b) as a function of the number of MSD points used for the fit. The curves correspond to different values of the reduced localization error x (x increases from top to bottom in (a), from bottom to top in (b)). (c), (d): Comparison between theory and simulations. Plain curves: expected relative error on fit parameters ((c): intercept a, (d): slope b). Dashed curves: observed relative standard deviation obtained from $N_S = 1000$ simulations for each value of $x = 10, 100$ and 1000 (x increases from top to bottom in (c), from bottom to top in (d)).

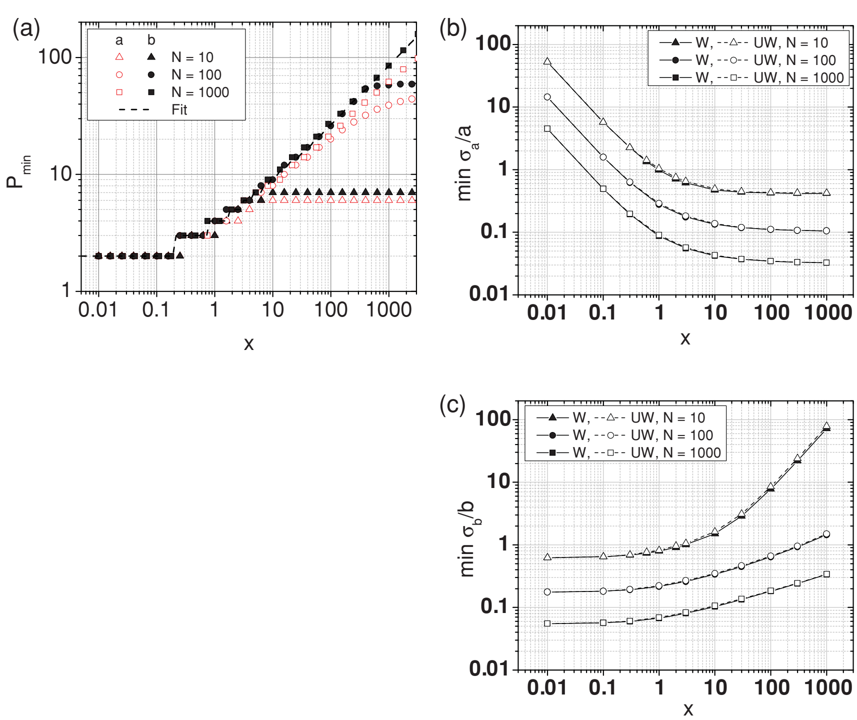

FIG. 5. (Color online) (a): Optimal number of MSD point $p_m in$ to obtain the minimum relative error on the weighted fit parameters a (open red symbols) and b (plain black symbols) for different trajectory sizes $N = 10$ (triangle), 100 (circle) or 1000 (square). These values are reasonably well fitted by a power law dependence (dashed curve), Eq. (30). (b), (c): Minimum values of the relative errors on the intercept a (b) and slope b (c). The minimum values for a weighted fit (plain symbols and curves) or unweighted fit (empty symbols and dashed curves) are identical for a given number of trajectory points ($N = 10$: triangle, $N = 100$: circle, $N = 1000$: square). The minimum relative error increases when the number of trajectory points N decreases.

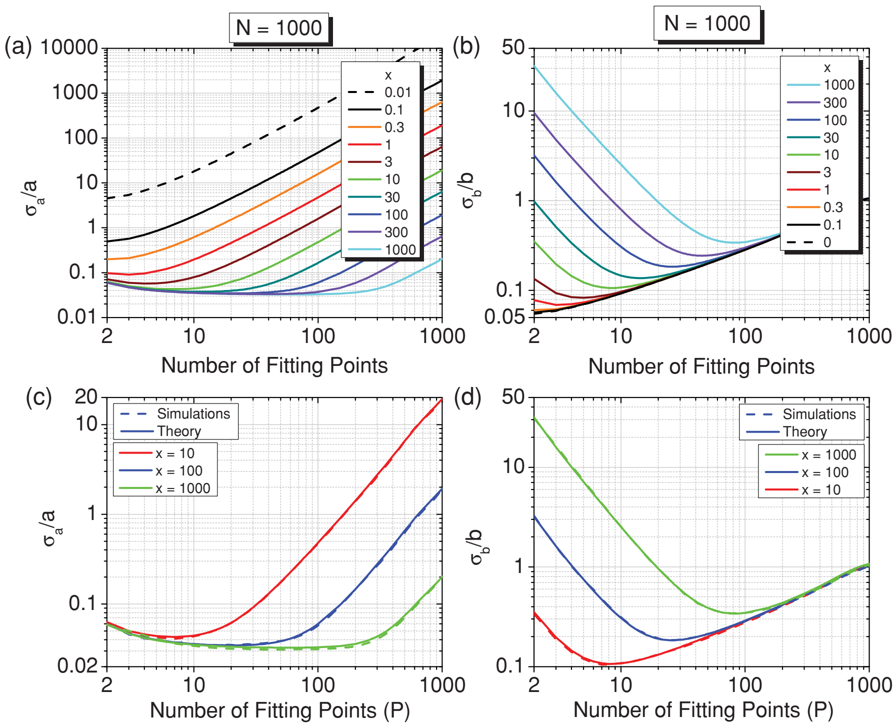

FIG. 6. (Color online) (a), (b): Relative error on fitted parameters (unweighted fit, $N = 1000$ points), Eq. F.23. Evolution of the relative errors on fitted parameters ((a): intercept a, (b): slope b) as a function of the number of MSD points used for the fit. The curves correspond to different values of reduced localization error (x increases from top to bottom in (a), from bottom to top in (b)). (c), (d): Comparison between theory and simulations. Plain curves: expected relative error on fit parameters ((c): intercept a, (d): slope b). Dashed curves: observed relative standard deviation obtained from $N_S = 1000$ simulations for each value of x (x increases from top to bottom in (c), from bottom to top in (d)).

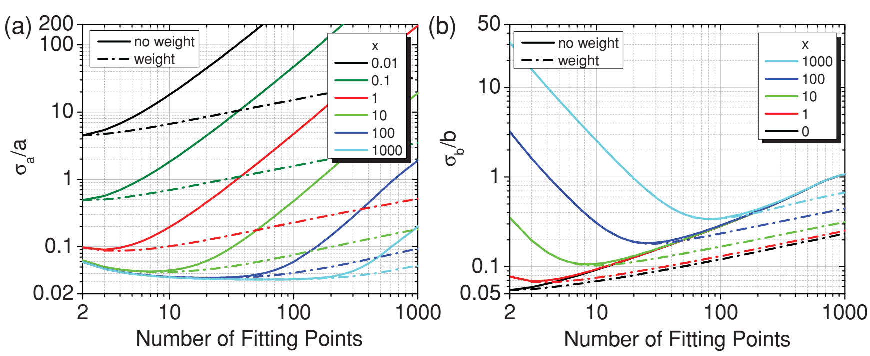

FIG. 7. (Color online) Comparison between weighted (dash-dot curves) and unweighted (plain curves) fits parameter relative errors for trajectories with $N = 1000$ points ((a): intercept a, (b): slope b). Although the weighted fits yield better results at large number of fitting points p, both types of fits have the same minimum error on the fitted parameters, obtained for similar number of fitting points (x increases from top to bottom in (a), from bottom to top in (b)).

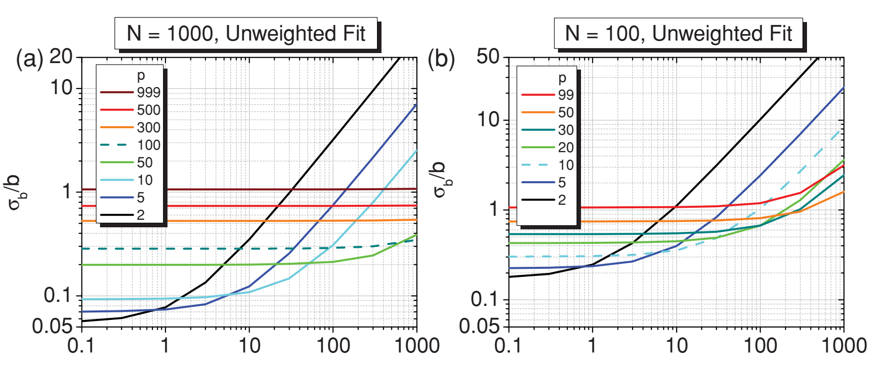

FIG. 8. (Color online) Relative error (unweighted fit) on the fitted diffusion coefficient D (Eq. F.23) as a function of reduced localization uncertainty x for different value of the number of fitting points p. (a): $N = 1000$, (b): $N = 100$ points per trajectory. p increases from bottom to top for small x.