Erratum: Two-dimensional colloidal aggregation mediated by the range of repulsive interactions [Phys. Rev. E 75, 041408 (2007)]

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We have recently found an error in a single line of the code of our simulations. This mistake provoked that the medium- and large size aggregates would not interact between them. As a consequence the reaction-limited cluster aggregation–diffusion-limited cluster aggregation (RLCA-DLCA) transition was reached at a much earlier time. After correcting the code, we noticed a substantial delay of this transition, coming from the repulsive interactions. Simulations with the corrected code were made with the following values of the parameters: $V_o=3k_BT$ and $\kappa d=1.0$, 1.5, 2.0, 2.5 and 5.0. As a result, Fig. 4 should be changed to the following set of figures.

We then observe that the small aggregates have a low fractal dimension, particularly for longer-ranged repulsive potentials (small κd), eventually crossing over to an RLCA-type d_f. However, with the corrected code, we cannot observe the further crossover RLCA-DLCA that is generally thought to occur, given the multiple contacts that two large colliding aggregates have.

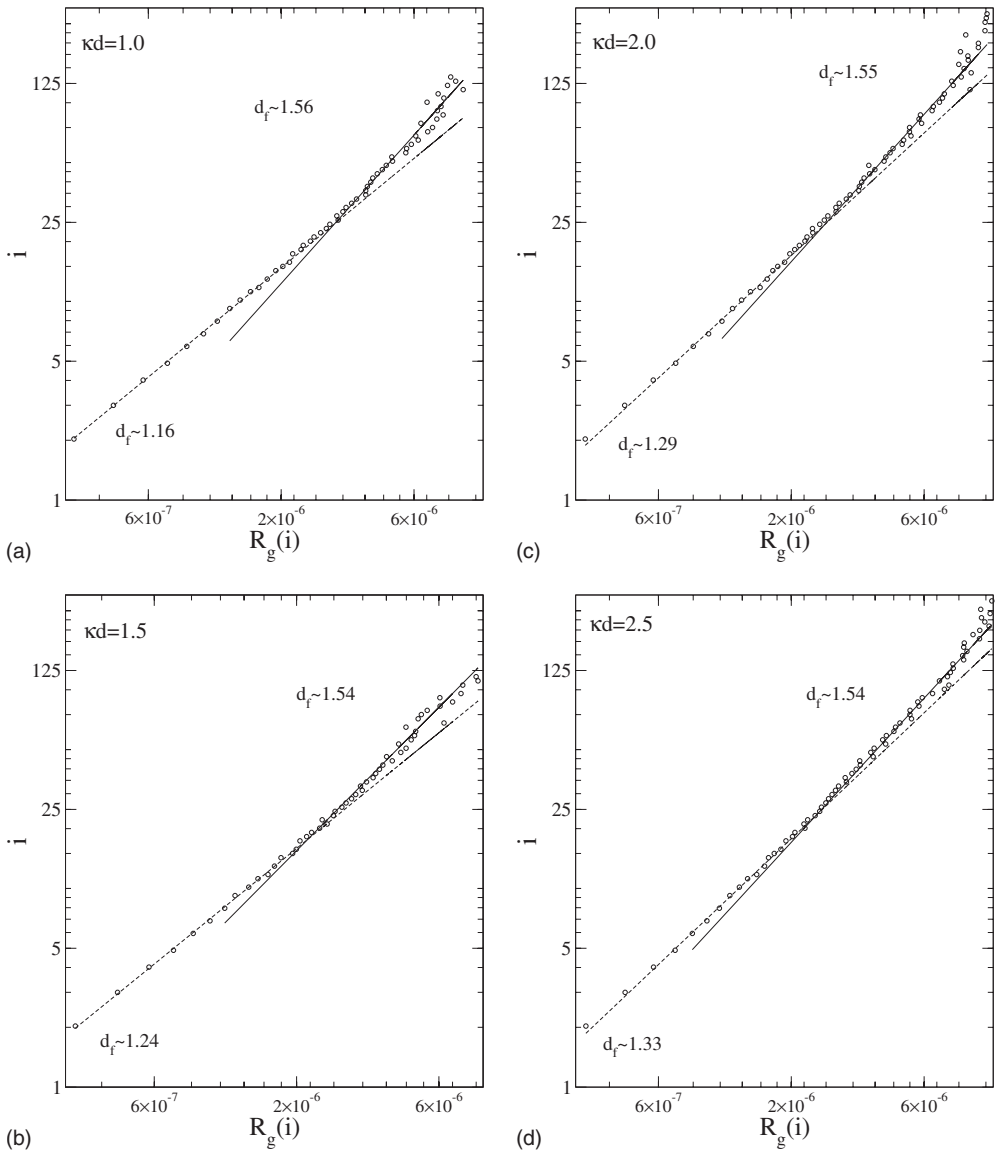

FIG. 4. The cluster size vs the radius of gyration for the simulations with $\kappa d=1.0$,1.5, 2.0, and 2.5. Two different regions can be distinguished, with different slopes for all the cases. The small aggregates tend to be more linear when the interaction range increases (small κd).

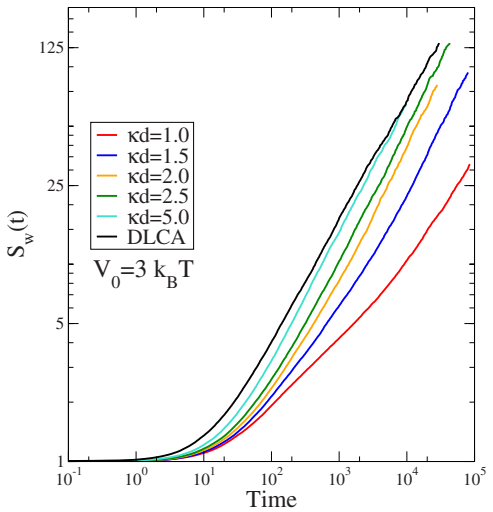

FIG. 7. (Color online). The weight-average cluster size for the different simulations performed. The curves from bottom to top correspond to κd=1.0,1.5,2.0,2.5,5.0 and a DLCA simulation.

This is confirmed by plotting the average cluster size vs time, from the simulations, which replaces Fig. 7(a), where we observe a transition from a slow aggregation zone (particularly for small values of κd) towards a faster aggregation zone, with a value of the kinetic exponent $z \sim 0.67$, characteristic of the RLCA aggregation. Analogously to the structural behavior, we cannot observe a second transition towards a DLCA regime with a kinetic exponent $z \sim 0.59$.

As a conclusion, with the corrected code we would need many more particles and a substantially longer computational time in order to have sufficiently large aggregates to obtain the RLCA-DLCA transition, which, for the time being, is not within the bounds of our possibilities.