Erratum: Transient behavior of heat transport in a thermal switch [Phys. Rev. B 81, 052302 (2010)]

Eduardo C. Cuansing and Jian-Sheng Wang

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We discovered an error in our code that affected the dynamical behavior of the energy current. In determining the current we numerically calculate several integrals using the trapezoidal rule. The integrals in Eq. (7), however, were numerically calculated incorrectly because of an error (a misplaced division by 2) in the code. This resulted in the current to erroneously decay faster than the correct behavior. The figures for the numerical results in our manuscript should therefore be replaced by Figs. 1–3 shown in this erratum.

Comparing the previously published figures and the corrected figures, we find that for long times the current in both cases do approach the steady-state values calculated independently from the Landauer formula. Furthermore, the initial negative spike in the transient current do also occur in both cases. The difference lies in how fast the current decays to the long-time steady-state value. From the corrected figures, the characteristic decay time is about 30×10^{-14} s. All of our other conclusions remain the same.

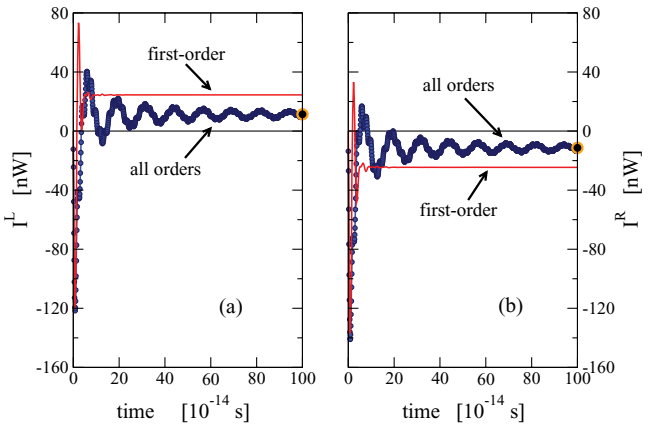

FIG. 1. (Color online) Corrected figure replacing the previously published Fig. 3. Shown are plots of the current flowing out of the (a) left and (b) right leads. The (red) lines are the results when only the first-order term in the perturbation is used in the calculation. The left lead has temperature $T_L = 330$ K while the right lead has temperature $T_R = 270$ K. The interparticle spring constant is $k = 0.625$ eV/(Å^2 u) and the on-site spring constant is $k_0 = 0.0625$ eV/(Å^2 u).

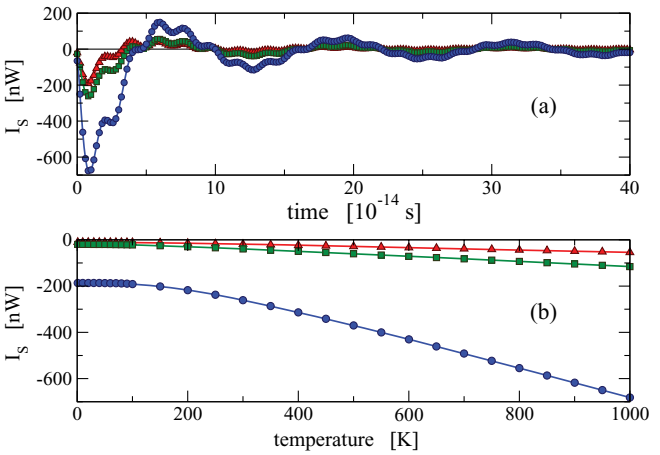

FIG. 2. (Color online) Corrected figures replacing the previously published Fig. 4. (a) The sum of the currents, $I_S = I^L + I^R$, when the average temperature between the leads are $T = 10$ K (red triangles), $T = 300$ K (green squares), and $T = 1000$ K (blue circles). The temperature offsets of the leads are ±10%. (b) Plots of I_S as functions of the average temperature T at time $t = 12.7[t]$ (red triangles), $t = 24.6[t]$ (green squares), and $t = 38.2[t]$ (blue circles), where $[t] = 10^{-14}$ s.

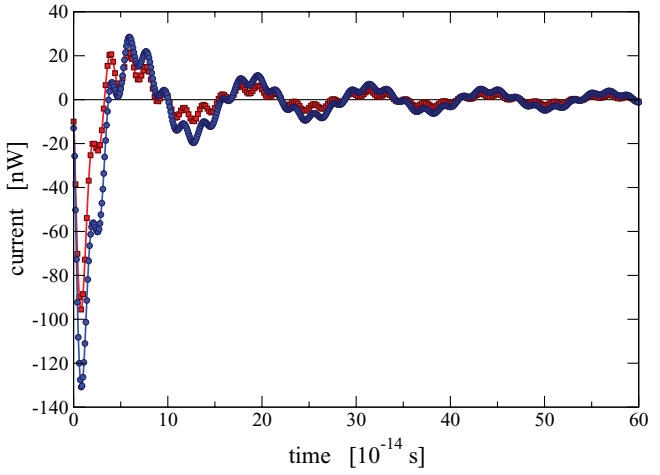

FIG. 3. (Color online) Corrected figures replacing the previously published Fig. 5. Shown are plots of the current when the left and right leads have the same temperature T, where $T = 10$ K for the (red) squares and $T = 300$ K for the (blue) circles.

