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Corrigendum

Corrigendum to "The discrete dipole approximation: An overview and recent developments" [J. Quant. Spectrosc. Radiat. Transfer 106 (2007) 558–589]

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The review [1] is still widely used as a general reference to the discrete dipole approximation, which motivates keeping it as accurate as possible. In the following we correct several errors, mostly typographical ones, which were uncovered over the years.

~~There was a sign error in Eq. (5) – it should read~~

$$\bar{\mathbf{L}}(\partial V_0, \mathbf{r}) = -\oint_{\partial V_0} \mathrm{d}^2 r' \frac{\hat{n}'\hat{R}}{R^3}. \tag{5}$$

In the first line of paragraph before Eq. (7) the subscript i should be added to the right-hand-side of the discretization definition; the corrected expression is

$$V = \cup_{i=1}^{N} V_i.$$

In the denominator of the fraction inside the second integral in Eq. (51) "R^3" should be replaced by "R^5" leading to

$$M_\mu(V_i) = \sum_\nu M^{(0)}_{i,\mu\nu}\chi E_\nu + \frac{1}{2}\int_{V_i} \mathrm{d}^3 R \frac{\exp(ikR)}{R^3}\left(k^2R^2 + ikR - 1\right)\sum_\nu R_\nu^2 \partial_\nu^2 \chi E_\mu - \frac{1}{2}\int_{V_i} \mathrm{d}^3 R \frac{\exp(ikR)}{R^5}\left(k^2R^2 + 3ikR - 3\right)\sum_{\nu\rho\tau} R_\mu R_\nu R_\rho R_\tau \partial_\rho \partial_\tau \chi E_\nu + O\left((kd)^4 \chi E\right), \tag{51}$$

The factor of dipole volume ($V_j = d^3$) was missing in Eq. (55), but its inverse was erroneously present in Eq. (57). They should read

$$\chi(\mathbf{r}')\mathbf{E}(\mathbf{r}') = d^3 \sum_i h^r(\mathbf{r}' - \mathbf{r}_i)\chi(\mathbf{r}_i)\mathbf{E}(\mathbf{r}_i), \tag{55}$$

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$$\overline{\mathbf{G}}_{ij} = \int_{\mathbf{R}^3/V_0} \mathrm{d}^3 r' \overline{\mathbf{G}}(\mathbf{r}_i, \mathbf{r}') h^{\mathrm{r}}(\mathbf{r}' - \mathbf{r}_j). \tag{57}$$

Moreover, the factor of 2 should be removed in the definition of q after Eq. (56) resulting in

$$q = \pi/d.$$

The factor of V_j was missing inside the sum in Eq. (62), and χ had a wrong subscript. The correct expression is

$$\overline{\boldsymbol{\Lambda}}_i = \overline{\mathbf{C}}_i + \sum_{j \neq i} \overline{\mathbf{G}}^{s}(\mathbf{r}_i, \mathbf{r}_j) V_j \chi_j \overline{\mathbf{C}}_j^{-1} \overline{\mathbf{C}}_i. \tag{62}$$

The only error that may lead to potential misinterpretation is related to the description of the weighted discretization. The multiplier of $\overline{\mathbf{G}}^{\mathrm{s}}$ in the second integral in Eq. (69) should be corrected, leading to

$$\overline{\mathbf{M}}_i^{\mathrm{e}} \overline{\boldsymbol{\chi}}_i^{\mathrm{e}} = \int_{V_i^{\mathrm{p}}} \mathrm{d}^3 r' \left(\overline{\mathbf{G}}(\mathbf{r}_i, \mathbf{r}') - \overline{\mathbf{G}}^{\mathrm{s}}(\mathbf{r}_i, \mathbf{r}') \right) \chi_i^{\mathrm{p}} + \int_{V_i^{\mathrm{s}}} \mathrm{d}^3 r' \left(\overline{\mathbf{G}}(\mathbf{r}_i, \mathbf{r}') \chi_i^{\mathrm{s}} \overline{\mathbf{T}} - \overline{\mathbf{G}}^{\mathrm{s}}(\mathbf{r}_i, \mathbf{r}') \chi_i^{\mathrm{p}} \right). \tag{69}$$

This error, together with Eq. (5) above, propagated from a previous publication [2], which has been recently corrected [3]. The latter erratum provides more details and discusses the correct interpretation of the weighted discretization.

Fortunately, the reported errata affect no other parts of the review [1].

References

[1] Yurkin MA, Hoekstra AG. The discrete dipole approximation: an overview and recent developments. J Quant Spectrosc Radiat Transf 2007;106:558–89.

[2] Yurkin MA, Maltsev VP, Hoekstra AG. Convergence of the discrete dipole approximation. I. Theoretical analysis. J Opt Soc Am A 2006;23:2578–91.

[3] Yurkin MA, Maltsev VP, Hoekstra AG. Convergence of the discrete dipole approximation. I. Theoretical analysis: erratum. J Opt Soc Am A 2015;32:2407–8.