光物性入門正誤表

1. p.3 図 1.2(b) の横軸（周波数）の桁数（2 刷修正済）

   (正)

   $2^{\times}10^{14}$　$4^{\times}10^{14}$　$6^{\times}10^{14}$　$8^{\times}10^{14}$　$1^{\times}10^{15}$　$1.2^{\times}10^{15}$

   (誤)

   $2^{\times}10^{15}$　$4^{\times}10^{15}$　$6^{\times}10^{15}$　$8^{\times}10^{15}$　$1^{\times}10^{16}$　$1.2^{\times}10^{16}$

2. p.6 漢字（3 刷修正済）

   (正) (1.5) 式をもとに, エネルギー等分配則に従って

   (誤) (1.5) 式をもとに, エネルギー等分配側に従って

3. p.52 図 2.27（2 刷修正済）

   (正) $k_c = 2\pi/\lambda, k_v = 0$

   (誤) $k_v = 2\pi/\lambda, k_c = 0$

4. p.92 図 3.20（2 刷修正済）

   (正) $\boldsymbol{k}, \boldsymbol{k}^{'}, \boldsymbol{k}^{''}$(すべて)

   (誤) $\bar{\boldsymbol{k}}, \bar{\boldsymbol{k}}^{'}, \bar{\boldsymbol{k}}^{''}$(すべて)

5. p.113 式 (4.43)（2 刷修正済）

   (正)

$$\hat{A}(\boldsymbol{r}, t) = \sum_k \sqrt{\frac{\hbar}{2\varepsilon_0 V \omega_k}} \left[\hat{a_k} \exp\{i(\boldsymbol{k}\cdot\boldsymbol{r} - \omega_k t)\} + \hat{a_k}^\dagger \exp\{-i(\boldsymbol{k}\cdot\boldsymbol{r} - \omega_k t)\}\right] \boldsymbol{e}_k$$

   (誤)

$$\hat{A}(\boldsymbol{r}, t) = \sum_k \sqrt{\frac{\hbar}{2\varepsilon_0 V \omega_k}} \left[\hat{a_k} \exp\{i(\boldsymbol{k}\cdot\boldsymbol{r} - \omega_k t)\} - \hat{a_k}^\dagger \exp\{-i(\boldsymbol{k}\cdot\boldsymbol{r} - \omega_k t)\}\right] \boldsymbol{e}_k$$

6. p.117 式 (4.52) 2 行目（2 刷修正済）

   (正)

$$= -\frac{\boldsymbol{E_0}\cdot\boldsymbol{\mu}_{ni}}{2\hbar}\left[\frac{\exp\{i(\omega_n - \omega_i - \omega_0)t\} - 1}{\omega_n - \omega_i - \omega_0} + \frac{\exp\{i(\omega_n - \omega_i - \omega_0)t\} - 1}{\omega_n - \omega_i - \omega_0}\right]$$

   (誤)

$$= -\frac{\boldsymbol{E_0}\cdot\boldsymbol{\mu}_{ni}}{2\hbar}\left[\frac{\exp\{i(\omega_n - \omega_i - \omega_0)t\}}{\omega_n - \omega_i - \omega_0} + \frac{\exp\{i(\omega_n - \omega_i - \omega_0)t\}}{\omega_n - \omega_i - \omega_0}\right]$$

7. p.117 下から 7 行目（3 刷修正済）

(正) 有効な遷移の起こるピークの範囲は $|\omega_{ni} - \omega_0| = 0 \sim 2\pi/t$ である．

(誤) 有効な遷移の起こるピークの範囲は $|\omega_{ni} - \omega_0| = -2\pi/t \sim 2\pi/t$ である．

8. p.123 式 (4.68)（2 刷修正済）

(正)

$$
\begin{aligned}
C_g(t) =& C_1 \exp(iu_1 t) + C_2 \exp(iu_2 t) \\
C_e(t) =& \frac{2}{R_{ge}} \exp(i\Delta\omega t)[C_1 u_1 \exp(iu_1 t) + C_2 u_2 \exp(iu_2 t)] \\
u_{1,2} =& -\frac{\Delta\omega}{2} \pm \frac{1}{2}\sqrt{(\Delta\omega)^2 + R_{ge}^2}
\end{aligned}
$$

(誤)

$$
\begin{aligned}
C_g(t) =& C_1 \exp(-iu_1 t) + C_2 \exp(-iu_2 t) \\
C_e(t) =& \frac{2}{R_{ge}} \exp(i\Delta\omega t)[C_1 u_1 \exp(-iu_1 t) + C_2 u_2 \exp(-iu_2 t)] \\
u_{1,2} =& -\frac{\Delta\omega}{2} \pm \frac{1}{2}\sqrt{(\Delta\omega)^2 + R_{ge}^2}
\end{aligned}
$$

9. p.123 式 (4.68) のすぐ下（3 刷修正済）

(正)

$$
\left\{
\begin{array}{c}
C_1 + C_2 = 1 \\
C_1 u_1 + C_2 u_2 = 0
\end{array}
\right.
\rightarrow
\left\{
\begin{array}{l}
C_1 = \dfrac{-u_2}{(u_1 - u_2)} \\
C_2 = \dfrac{u_1}{(u_1 - u_2)}
\end{array}
\right.
$$

(誤)

$$
\left\{
\begin{array}{c}
C_1 + C_2 = 1 \\
C_1 u_1 + C_2 u_1 = 0
\end{array}
\right.
\rightarrow
\left\{
\begin{array}{l}
C_1 = \dfrac{-u_2}{(u_1 - u_2)} \\
C_2 = \dfrac{u_1}{(u_1 - u_2)}
\end{array}
\right.
$$

10. p.128 ほぼ中央（2 刷修正済）

(正) いま離調周波数 $\Delta\omega = \omega_{ge} - \omega_0$ とすると，
(誤) いま離調周波数 $\Delta\omega = \omega_{ge} - \omega$ とすると，

11. p.142(4.116) 式の指数（3 刷修正済）

(正)

$$
\begin{aligned}
\left[\frac{\hat{\boldsymbol{p}}^2}{2m_0} + V(\boldsymbol{r}) + \frac{\hbar}{m_0}\boldsymbol{k}\cdot\hat{\boldsymbol{p}} + \frac{\hbar^2 k^2}{2m_0}\right] u_{nk}(\boldsymbol{r}) = E_n(\boldsymbol{k}) u_{nk}(\boldsymbol{r}) \\
\left[\hat{H}_0 + \frac{\hbar}{m_0}\boldsymbol{k}\cdot\hat{\boldsymbol{p}}\right] u_{nk}(\boldsymbol{r}) = \left[E_n(\boldsymbol{k}) - \frac{\hbar^2 k^2}{2m_0}\right] u_{nk}(\boldsymbol{r})
\end{aligned}
$$

(誤)

$$\left[\frac{\hat{\boldsymbol{p}}^2}{2m_0}+V(\boldsymbol{r})+\frac{\hbar^2}{m_0}\boldsymbol{k}\cdot\hat{\boldsymbol{p}}+\frac{\hbar^2k^2}{2m_0}\right]u_{nk}(\boldsymbol{r})=E_n(\boldsymbol{k})u_{nk}(\boldsymbol{r})$$
$$\left[\hat{H}_0+\frac{\hbar^2}{m_0}\boldsymbol{k}\cdot\hat{\boldsymbol{p}}\right]u_{nk}(\boldsymbol{r})=\left[E_n(\boldsymbol{k})-\frac{\hbar^2k^2}{2m_0}\right]u_{nk}(\boldsymbol{r})$$

12. p.145 (4.125) 式（3 刷修正済）

(正)

$$\begin{aligned}E_c(\boldsymbol{k})=&\frac{1}{2}E_g+\frac{\hbar^2k^2}{2m_0}+\frac{1}{2}\sqrt{{E_g}^2+4k^2P^2}\\E_{hh}(\boldsymbol{k})=&\frac{\hbar^2k^2}{2m_0}\\E_{lh}(\boldsymbol{k})=&\frac{1}{2}E_g+\frac{\hbar^2k^2}{2m_0}-\frac{1}{2}\sqrt{{E_g}^2+4k^2P^2}\end{aligned}$$

(誤)

$$\begin{aligned}E_c(\boldsymbol{k})=&E_g+\frac{\hbar^2k^2}{2m_0}+\frac{1}{2}\sqrt{{E_g}^2+4k^2P^2}\\E_{hh}(\boldsymbol{k})=&\frac{\hbar^2k^2}{2m_0}\\E_{lh}(\boldsymbol{k})=&\frac{\hbar^2k^2}{2m_0}-\frac{1}{2}\sqrt{{E_g}^2+4k^2P^2}\end{aligned}$$

13. p.152 式 (4.132)（2 刷修正済）

(正)

$$\begin{aligned}\dot{C}_e(t)=&-\frac{1}{2}\gamma_eC_e(t)+\left(\frac{i}{2}\right)R_{ge}\exp(-i\Delta\omega t)C_g(t)\\\dot{C}_g(t)=&-\frac{1}{2}\gamma_gC_g(t)+\left(\frac{i}{2}\right)R_{ge}^*\exp(-i\Delta\omega t)C_e(t)\end{aligned}$$

(誤)

$$\begin{aligned}\dot{C}_e(t)=&-\frac{1}{2}\gamma_eC_e(t)-\left(\frac{i}{2}\right)R_{ge}\exp(-i\Delta\omega t)C_g(t)\\\dot{C}_g(t)=&-\frac{1}{2}\gamma_gC_g(t)+\left(\frac{i}{2}\right)R_{ge}^*\exp(-i\Delta\omega t)C_e(t)\end{aligned}$$

14. p.156(4.142) の ρ 要素（2 刷修正済）

(正)

$$\begin{bmatrix}\rho_{ee} & \rho_{ge}\\ \rho_{eg} & \rho_{gg}\end{bmatrix}$$

(誤)

$$\begin{bmatrix} \rho_{gg} & \rho_{ge} \\ \rho_{eg} & \rho_{ee} \end{bmatrix}$$

15. p.157 式 (4.150)（2 刷修正済）

(正)

$U = \rho_{eg}\ \exp\ (i\omega t) + \rho_{ge}\ \exp\ (-i\omega t)$

$V = i\rho_{eg}\ \exp\ (i\omega t) - i\rho_{ge}\ \exp\ (-i\omega t)$

$W = \rho_{ee} - \rho_{gg}$

(誤)

$U = \rho_{eg} + \rho_{ge}$

$V = i(\rho_{eg} + \rho_{ge})$

$W = \rho_{ee} - \rho_{gg}$

16. p.158(4.152) 式（2 刷修正済）

(正)

$$\begin{aligned}
\dot{\rho}_{ee} &= \dot{C}_e C_e^* + C_e \dot{C}_e^* \\
&= -\gamma_e \rho_{ee} - \left(\frac{i}{2}\right) R_{eg}[\rho_{eg}\mathrm{exp}(iwt) - \rho_{ge}\mathrm{exp}(-iwt)] \\
\dot{\rho}_{gg} &= -\gamma_g \rho_{gg} + \left(\frac{i}{2}\right) R_{eg}[\rho_{eg}\mathrm{exp}(iwt) - \rho_{ge}\mathrm{exp}(-iwt)] \\
\dot{\rho}_{eg} &= \dot{\rho}_{ge}^* = -(i\omega_{eg} + \gamma_{eg})\rho_{eg} - \left(\frac{i}{2}\right) R_{eg}(\rho_{ee} - \rho_{gg})\mathrm{exp}(-iwt)
\end{aligned}$$

(誤)

$$\begin{aligned}
\dot{\rho}_{ee} &= \dot{C}_e C_e^* + C_e \dot{C}_e^* \\
&= -\gamma_e \rho_{ee} - \left(\frac{i}{2}\right)(R_{eg}\rho_{eg} + R_{ge}\rho_{ge})e^{-i\Delta\omega t} \\
\dot{\rho}_{gg} &= -\gamma_g \rho_{gg} - \left(\frac{i}{2}\right)(R_{ge}\rho_{ge} + R_{eg}\rho_{eg})e^{i\Delta\omega t} \\
\dot{\rho}_{eg} &= \dot{\rho}_{ge}^* = \dot{C}_e C_g^* + C_e \dot{C}_g^* \\
&= -(i\Delta\omega + \gamma_{eg})\rho_{eg} + (i/2)R_{eg}(\rho_{ee} - \rho_{gg})
\end{aligned}$$

17. p.158(4.153) 式（2 刷修正済）

(正)

$$\frac{d}{dt}\begin{bmatrix} U \\ V \\ W \end{bmatrix} = \begin{bmatrix} -\gamma_{eg} & \Delta\omega & 0 \\ -\Delta\omega & -\gamma_{eg} & R_{eg} \\ 0 & -R_{eg} & -\gamma_e \end{bmatrix} \begin{bmatrix} U \\ V \\ W \end{bmatrix}$$

(誤)

$$\frac{d}{dt}\begin{bmatrix} U \\ V \\ W \end{bmatrix} = \begin{bmatrix} -\gamma_{eg} & -\Delta\omega & 0 \\ \Delta\omega & -\gamma_{eg} & R_{eg} \\ 0 & -R_{eg} & -\gamma_e \end{bmatrix} \begin{bmatrix} U \\ V \\ W \end{bmatrix}$$