Képletgyűjtemény – ZH1

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$$\tilde{\mathbf{E}}(\mathbf{r},t) = \tilde{\mathbf{E}}_\mathbf{0} \cdot e^{i(\omega t - \mathbf{kr})} \qquad \tilde{n} \equiv n - \mathrm{i} \cdot \kappa$$

$$\tilde{k} \equiv k_{re} - ik_{im} \qquad k_{re} = k_0 \cdot n \qquad k_{im} = k_0 \cdot \kappa \qquad k_0 \equiv \frac{2\pi}{\lambda_0}$$

$$\langle \mathbf{S}(\mathbf{r},T) \rangle = \frac{\mathbf{k_{re}}}{\mu\omega} \frac{|\mathbf{E_0}|^2}{2} e^{-2\mathbf{k_{im}}\mathbf{r}} \qquad I \equiv |\langle \mathbf{S}(\mathbf{r},T) \rangle| \qquad I(z) = I_0 \cdot e^{-2k_{im}z} \qquad \delta \equiv \frac{1}{k_{im}}$$

$$E_x(\mathbf{r}) \equiv E_0 \cdot u(x,y,z) \cdot e^{-ikz} \qquad u(x,y,z) = \frac{w_0}{w} \cdot e^{-\left(\frac{r}{w}\right)^2} \cdot e^{-ik\frac{r^2}{2R}} \cdot e^{i\varphi}$$

$$w(z) = w_0 \sqrt{1 + \left(\frac{z}{z_R}\right)^2} \qquad R(z) = z\left[1 + \left(\frac{z_R}{z}\right)^2\right] \qquad \varphi(z) = \arctan\left(\frac{z}{z_R}\right)$$

$$z_R \equiv \frac{\pi w_0^2}{\lambda} \qquad \theta_d = \frac{\lambda}{\pi w_0}\ [\mathrm{rad}]$$

$$n \sin\theta = n' \sin\theta' \qquad \left.\frac{dOPL}{d\xi}\right|_{\xi=\xi_0} = 0 \qquad OPL \equiv c \cdot \Delta t = \int_{P_1}^{P_2} n \cdot dl$$

$$\tau_s = \frac{2n \cdot \cos\theta}{n \cdot \cos\theta + n' \cdot \cos\theta'} \qquad \tau_p = \frac{2n \cdot \cos\theta}{n' \cdot \cos\theta + n \cdot \cos\theta'} \qquad T = |\tau|^2 \cdot \frac{n' \cos\theta'}{n \cos\theta}$$

$$\rho_s = \frac{n \cdot \cos\theta - n' \cdot \cos\theta'}{n \cdot \cos\theta + n' \cdot \cos\theta'} \qquad \rho_p = \frac{n' \cdot \cos\theta - n \cdot \cos\theta'}{n' \cdot \cos\theta + n \cdot \cos\theta'} \qquad R = |\rho|^2 \qquad R + T = 1$$

$$\rho_s = \frac{1 + i\gamma}{1 - i\gamma} = e^{i\varphi_s} \qquad \rho_p = \frac{1 + i\gamma\left(\frac{n}{n'}\right)^2}{1 - i\gamma\left(\frac{n}{n'}\right)^2} = e^{i\varphi_p} \qquad \gamma \equiv i\frac{k_z{}'}{k_z} = \frac{\sqrt{n^2 \sin^2\theta - n'^2}}{n\cos\theta}$$

$$k_z' = 0 - ik_z\gamma \qquad k'_{im} = k_z\gamma$$

$$f_2 = r_2 \frac{n_2}{n_2 - n_1} \qquad P_2 \equiv \frac{n_2}{f_2} = \frac{n_2 - n_1}{r_2} \qquad \frac{n'}{s'} = \frac{n'}{f'} + \frac{n}{s}$$

$$m_L = \frac{n'}{n} m^2 \qquad \frac{n'}{n} m_\alpha \cdot m = 1 \qquad \frac{n}{f} = -\frac{n'}{f'} \qquad P = P_1 + P_2 - P_1 P_2 \frac{d_1}{n_1}$$

$$\mathbf{R_2} = \begin{bmatrix} 1 & 0 \\ -P_2 & 1 \end{bmatrix} \qquad \mathbf{T_1} = \begin{bmatrix} 1 & \frac{d_1}{n_1} \\ 0 & 1 \end{bmatrix} \qquad \mathbf{M} = \mathbf{T}_N \cdot \mathbf{R}_N \cdot \ldots \cdot \mathbf{T}_2 \cdot \mathbf{R}_2 \cdot \mathbf{T}_1$$

$$z' = (1 - A)\frac{n'}{C} \qquad z = (D - 1)\frac{n}{C}$$

Képletgyűjtemény – ZH2

$$I = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\delta \qquad \delta \equiv \Phi_2 - \Phi_1 = \Delta\mathbf{k}\cdot\mathbf{r} + \Delta\varphi \qquad \Delta\varphi = \frac{2\pi}{\lambda_0}\cdot OPD = \omega\cdot\Delta t$$

$$OPD \equiv OPL_2 - OPL_1 \qquad V \equiv \frac{I_{max} - I_{min}}{I_{max} + I_{min}} = \frac{2\sqrt{I_1 I_2}}{I_1 + I_2}$$

$$I(\delta) = I_1\left(\frac{\sin(\delta N/2)}{\sin(\delta/2)}\right)^2 \qquad \delta = \frac{2\pi}{\lambda}\sin\theta\cdot a \qquad \delta_m = m\cdot 2\pi \qquad m\in\mathbb{Z}$$

$$\Delta\delta = \frac{2\pi}{\lambda}\Delta\sin\theta\cdot a = \frac{2\pi}{N} \qquad \mathcal{R} \equiv \frac{\lambda}{\Delta\lambda} = m\cdot N = m\frac{D}{a}$$

$$k_{1y} = k_{0y} + m\frac{2\pi}{a} = k_{0y} + mK \qquad \mathbf{K} \equiv \hat{\mathbf{y}}\cdot\frac{2\pi}{a}$$

$$\frac{I'}{I} = \frac{1}{1 + \frac{4R}{(1-R)^2}\sin^2(\delta/2)} \qquad \delta = \frac{2\pi}{\lambda}2d \qquad \delta_m = m\cdot 2\pi \qquad m\in\mathbb{N}$$

$$\delta_{FWHM} = 2\frac{1-R}{\sqrt{R}} \qquad \mathcal{F} \equiv \frac{2\pi}{\delta_{FWHM}} = \frac{\pi\sqrt{R}}{1-R} \qquad \mathcal{R} \equiv \left|\frac{\lambda}{\Delta\lambda}\right| = m\cdot\mathcal{F}$$

$$E(x',y') = \frac{e^{ikz'}\cdot e^{i\frac{k}{2z'}\left(x'^2+y'^2\right)}}{i\cdot\lambda z'}\iint_\Sigma E(x,y)\cdot e^{-i\frac{k}{z'}(x'x+y'y)}dxdy$$

$$I(x',y') = \frac{\mathrm{v}\varepsilon}{2}\frac{E_0^2}{(\lambda z')^2}\, l_x^2 l_y^2\,\mathrm{sinc}^2\left(\frac{x' l_x}{\lambda z'}\right)\mathrm{sinc}^2\left(\frac{y' l_y}{\lambda z'}\right) \qquad E(x,y) = E_0 \qquad x_{Nyquist} \equiv \frac{\lambda z'}{l_x}$$

$$R_{Airy} \equiv 1{,}22\frac{\lambda z'}{D} \qquad \mathrm{sinc}(\xi) \equiv \frac{\sin(\pi\xi)}{\pi\xi}$$

$$E(x',y') = \frac{e^{ikz'}\cdot e^{i\frac{k\left(x'^2+y'^2\right)}{2z'}}}{i\lambda z'}\iint_\Sigma E(x,y)\cdot e^{i\frac{k}{2z'}(x^2+y^2)}\cdot e^{-i\frac{k}{z'}(x'x+y'y)}dxdy$$

$$E(x',y') = \frac{e^{i\frac{k\left(x'^2+y'^2\right)}{2f}}}{i\lambda f}\iint_\Sigma E_0\cdot e^{-i\frac{k}{f}(x'x+y'y)}dxdy \qquad E(x,y) = E_0\cdot e^{-i\frac{k}{2f}(x^2+y^2)}$$

$$I(x',y') = \frac{\mathrm{v}\varepsilon}{2}\frac{E_0^2}{(\lambda f)^2}\, l_x^2 l_y^2\,\mathrm{sinc}^2\left(\frac{x' l_x}{\lambda f}\right)\mathrm{sinc}^2\left(\frac{y' l_y}{\lambda f}\right) \qquad x_{Nyquist} = \frac{\lambda f}{l_x}$$

$$R_{Airy} = 1{,}22\frac{\lambda f}{D} \qquad w = \frac{1}{\pi}\frac{\lambda f}{w_0}$$