

4.7. 電圧

- ① e_0 : 鉄塔頂部に侵入する雷電圧
- i_0 : " " 雷電流
- e_r : 雷道の反射電圧
- i_r : " " 電流
- i_g : 架空地線への透過電流

i_R : 接地線への透過電流

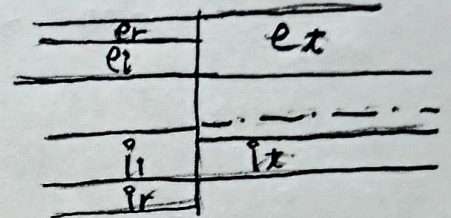
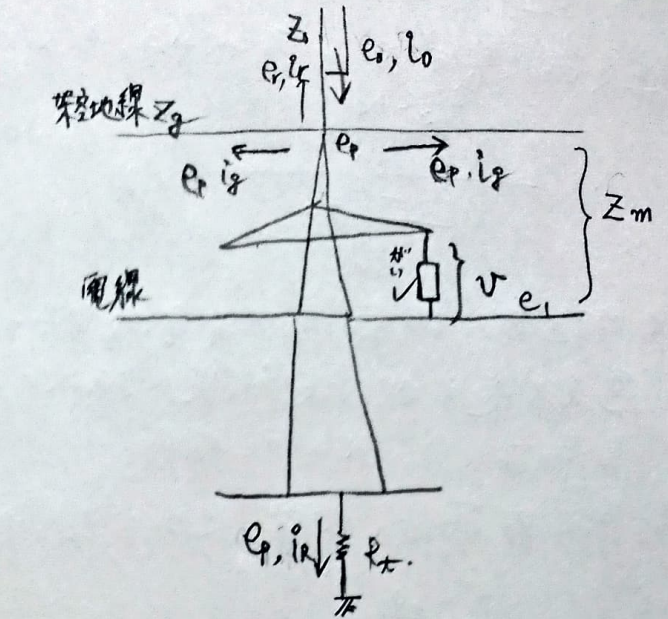
$$\begin{cases} e_0 + e_r = e_p \\ i_0 - i_r = 2i_g + i_R \end{cases}$$

$$i_0 = \frac{e_0}{Z_0}, \quad i_r = \frac{e_r}{Z_0}, \quad i_R = \frac{e_p}{R_t}, \quad i_g = \frac{e_p}{Z_g}$$

$$\therefore \frac{e_0}{Z_0} - \frac{e_r}{Z_0} = 2 \cdot \frac{e_p}{Z_g} + \frac{e_p}{R_t}$$

$$\frac{e_0}{Z_0} - \frac{e_p - e_0}{Z_0} = \left(\frac{2}{Z_g} + \frac{1}{R_t} \right) e_p$$

$$2 \frac{e_0}{Z_0} = \left(\frac{2}{Z_g} + \frac{1}{R_t} + \frac{1}{Z_0} \right) e_p$$



$$e_p = \frac{2 \frac{e_0}{Z_0}}{\frac{2}{Z_g} + \frac{1}{R_t} + \frac{1}{Z_0}} = \frac{2 Z_g R_t}{2 R_t Z_0 + Z_g Z_0 + Z_g R_t} e_0 //$$

② 電線に誘導した電圧 e_1 は

$$e_1 = Z_m i_g \text{ である}$$

$$= Z_m \frac{e_p}{Z_g} = \frac{Z_m}{Z_g} \times \frac{2 Z_g R_t}{2 R_t Z_0 + Z_g Z_0 + Z_g R_t} e_0 = \frac{2 Z_m R_t}{2 Z_0 R_t + Z_g Z_0 + Z_g R_t} e_0 //$$

加わる電圧 v は

$$v = e_p - e_1 = \frac{2 R_t (Z_g - Z_m)}{2 Z_0 R_t + Z_g Z_0 + Z_g R_t} e_0 //$$

$$(3) v = \frac{2 \times 15 \times (500 - 150)}{2 \times 400 \times 15 + 500 \times 400 + 500 \times 15} \times 7000 \text{ kV} \approx 334.85 \approx 334.9 \text{ kV} //$$