



$$R_{th} = R_2 + R_3 + \frac{(r + R_5) R_4}{r + R_5 + R_4}$$

$$r_z = R_{th} + R_1$$

$$I_{R_1} = \frac{\mathcal{E}_w}{r_z}$$

$$\mathcal{E}_w = U_{R_4} = \frac{\mathcal{E}}{r + R_4 + R_5} R_4$$