**Комментарии к задаче 5.3**

① $\omega L_{\text{н}} \frac{di_{\text{н}}}{d\vartheta} + i_{\text{н}} R_{\text{н}} = \pm E_d$ Задача 5.3

$$i_{\text{н}} = \pm \frac{E_d}{R_{\text{н}}}\left(1 - \frac{2e^{-\vartheta/\omega\tau}}{1+e^{-\pi/\omega\tau}}\right) = \pm \frac{E_d}{R_{\text{н}}}\left(1 - \frac{2e^{-\omega t/\omega\tau}}{1+e^{-\omega T/2\omega\tau}}\right) =$$

$$= \pm \frac{E_d}{R_{\text{н}}}\left(1-\frac{2e^{-t/\tau}}{1+e^{-T/2\tau}}\right)$$

$\frac{\omega T}{2} = \frac{2\pi}{T}\cdot\frac{T}{2} = \pi$

$t = \frac{T}{2}$

$$I_{max} = \pm\frac{E_d}{R_{\text{н}}}\left(\frac{1+e^{-T/2\tau} - 2e^{-T/2\tau}}{1+e^{-T/2\tau}}\right) =$$

$$I_{max} = \frac{E_d}{R_{\text{н}}}\frac{(1-e^{-T/2\tau})}{(1+e^{-T/2\tau})}$$

; $\tau = \frac{L}{R} = 2{,}5\cdot10^{-3}$ с

$$I_{max} = \frac{10}{0{,}4}\frac{1-e^{-2}}{1+e^{-2}} = 16 \text{ А}$$

(к задаче 5.3) ①

$$i_{\text{н}} - \frac{E_d}{R_{\text{н}}} = -\frac{2E_d}{R_{\text{н}}}\frac{e^{-t/\tau}}{1+e^{-T/2\tau}}$$

для первого полупериода от 0 до $T/2$

$$\left(i_{\text{н}} = \frac{E_d}{R_{\text{н}}} - \frac{2E_d\, e^{-t/\tau}}{R_{\text{н}}(1+e^{-T/2\tau})}\right)$$

$$i_{\text{н}} - \frac{E_d}{R_{\text{н}}} = \frac{E_d}{R_{\text{н}}}e^{-t/\tau} - \frac{E_d}{R_{\text{н}}}e^{-t/\tau} - \frac{2E_d}{R_{\text{н}}}\frac{\cdot e^{-t/\tau}}{1+e^{-T/2\tau}}$$

$$!\ i_{\text{н}} - \frac{E_d}{R_{\text{н}}} = \left(-\frac{E_d}{R_{\text{н}}} + \underbrace{\frac{E_d}{R_{\text{н}}} - \frac{2E_d}{R_{\text{н}}}\frac{1}{1+e^{-T/2\tau}}}_{-I_{max}}\right)e^{-t/\tau}$$

$$i_{\text{н}} - \frac{E_d}{R_{\text{н}}} = \left(-I_{max} - \frac{E_d}{R_{\text{н}}}\right)e^{-t/\tau}$$

$$\boxed{!\ i_{\text{н}} = \left(-I_{max} - \frac{E_d}{R_{\text{н}}}\right)e^{-t/\tau} + \frac{E_d}{R_{\text{н}}}}$$

$$i(t) = \left(-I_{max} - \frac{E_d}{R}\right) e^{-t/\tau} + \frac{E_d}{R}$$

$$t_1 = ? \quad i(t) = 0$$

$$0 = \left(-I_{max} - \frac{E_d}{R}\right) e^{-t_1/\tau} + \frac{E_d}{R}$$

$$e^{-t_1/\tau} = -\frac{-E_d/R}{I_{max} + \frac{E_d}{R}} = \frac{E_d/R}{\frac{E_d}{R} + I_{max}}$$

$$-t_1/\tau = \ln \frac{E_d/R}{\frac{E_d}{R} + I_{max}}$$

$$+t_1 = -\tau \ln \frac{E_d/R}{\frac{E_d}{R} + I_{max}} \quad !$$