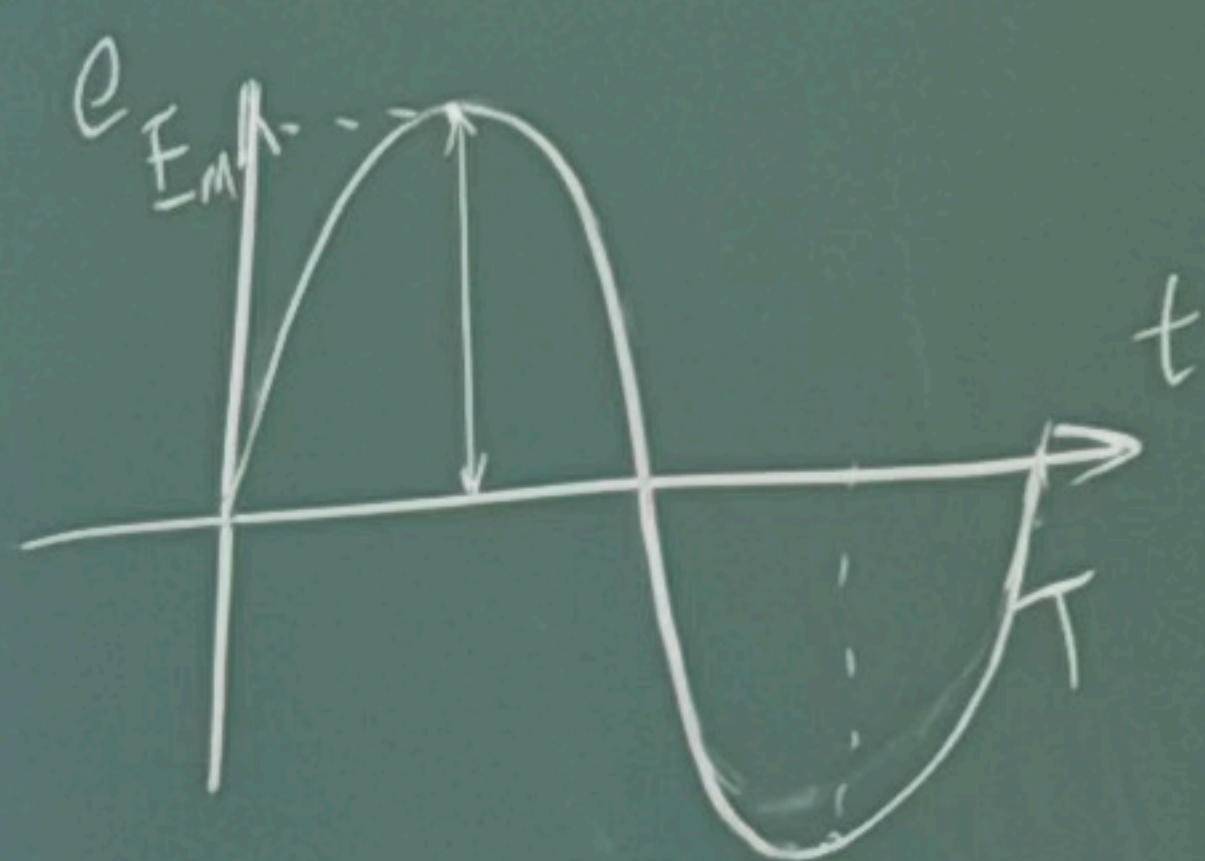
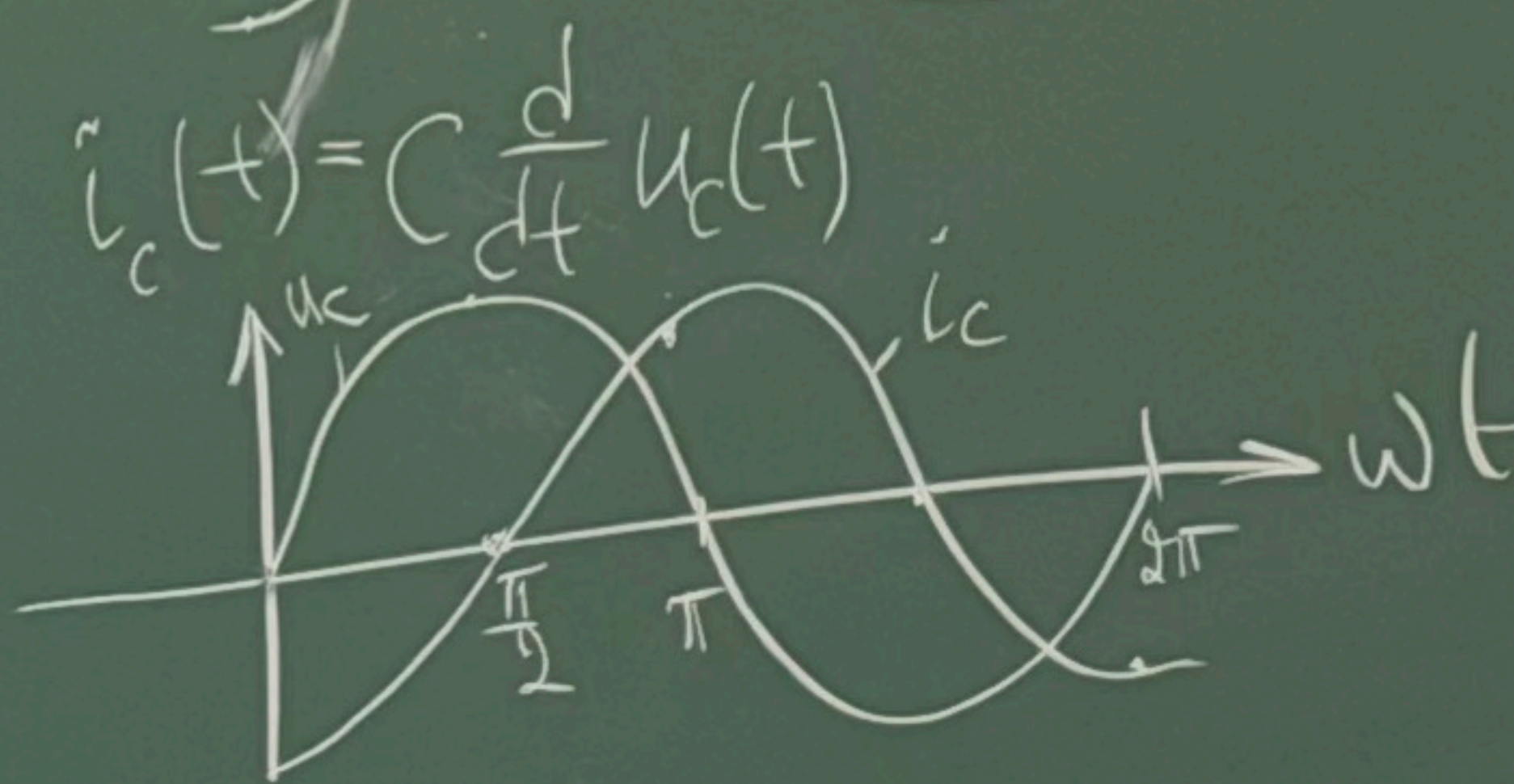
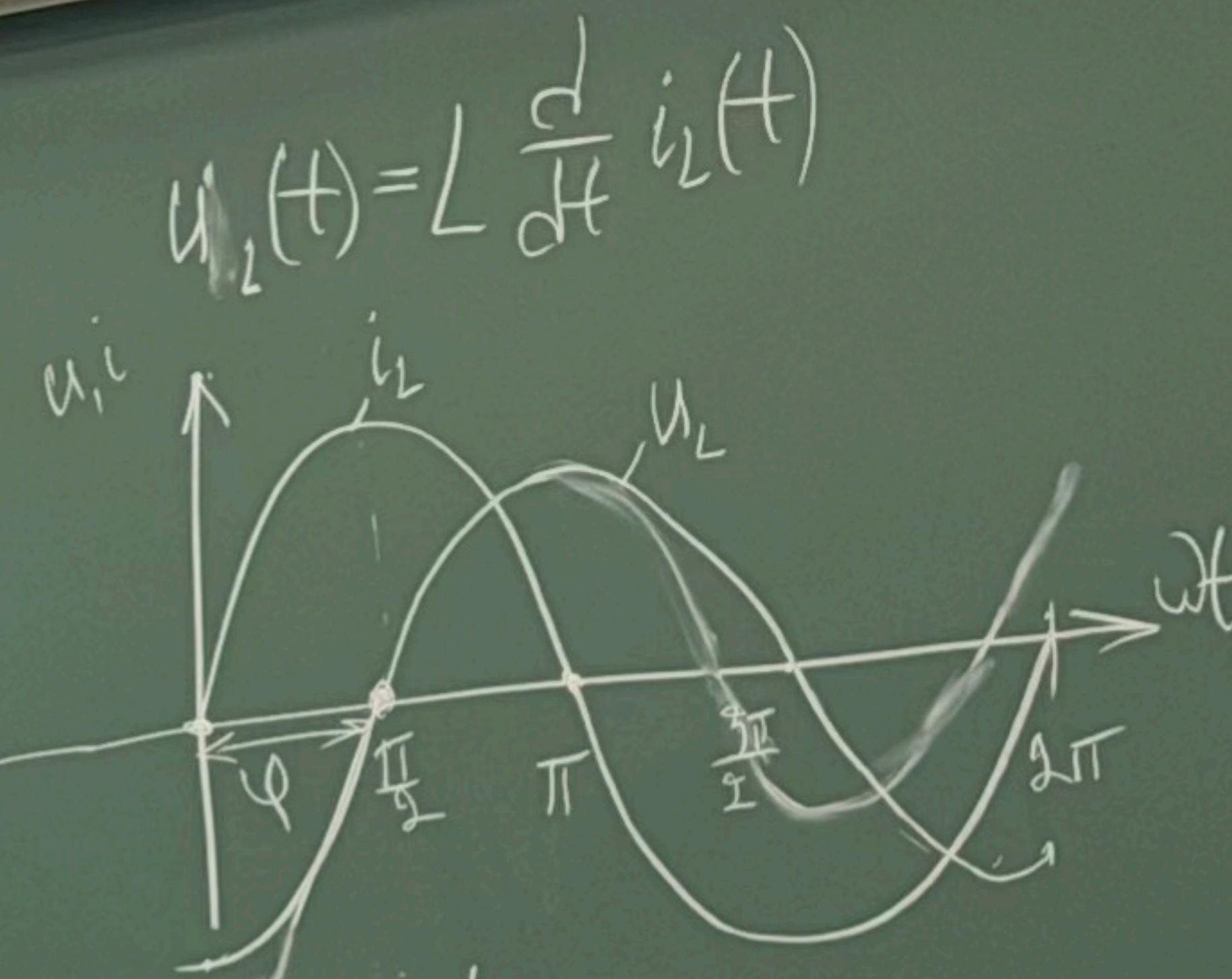
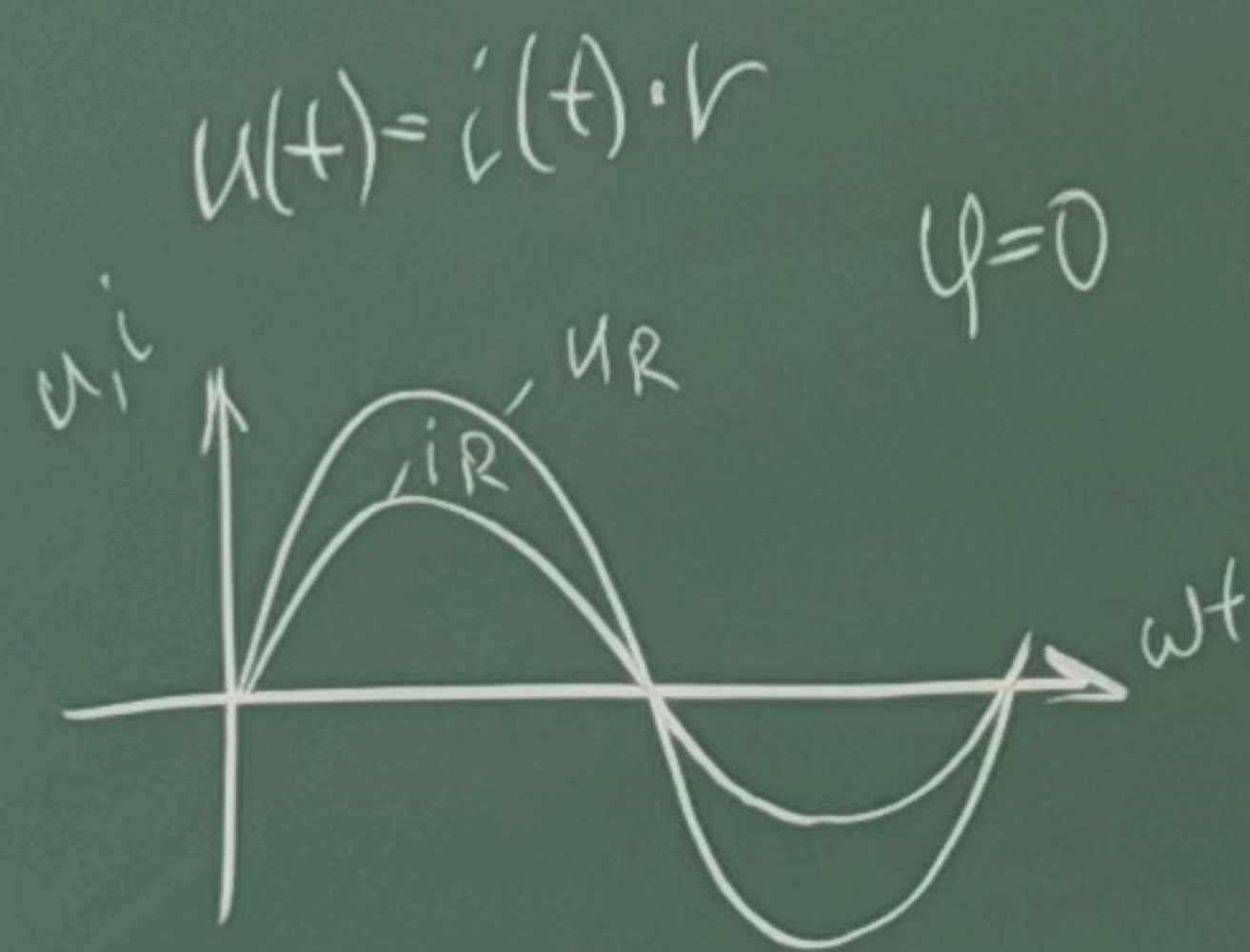


$$\begin{aligned} U_R + U_L + U_C &= E_m \\ I \cdot Z_R + I \cdot Z_L + I \cdot Z_C &= E_m \\ I (r + jX_L - jX_C) &= E_m \end{aligned}$$



$$\begin{aligned} e(t) &= E_m \sin(\omega t + \psi_e) \\ f &= \frac{1}{T} [\text{Hz}] \\ \omega &= 2\pi f [\frac{\text{rad}}{\text{s}}] \end{aligned}$$



$$\begin{aligned} \psi_u &= \frac{\pi}{2} \\ \psi_i &= 0 \\ \varphi_L &= \psi_u - \psi_i = \frac{\pi}{2} \end{aligned}$$

$$\begin{aligned} \psi_u &= 0 \\ \psi_i &= \frac{\pi}{2} \\ \varphi_C &= \psi_u - \psi_i = -\frac{\pi}{2} \end{aligned}$$

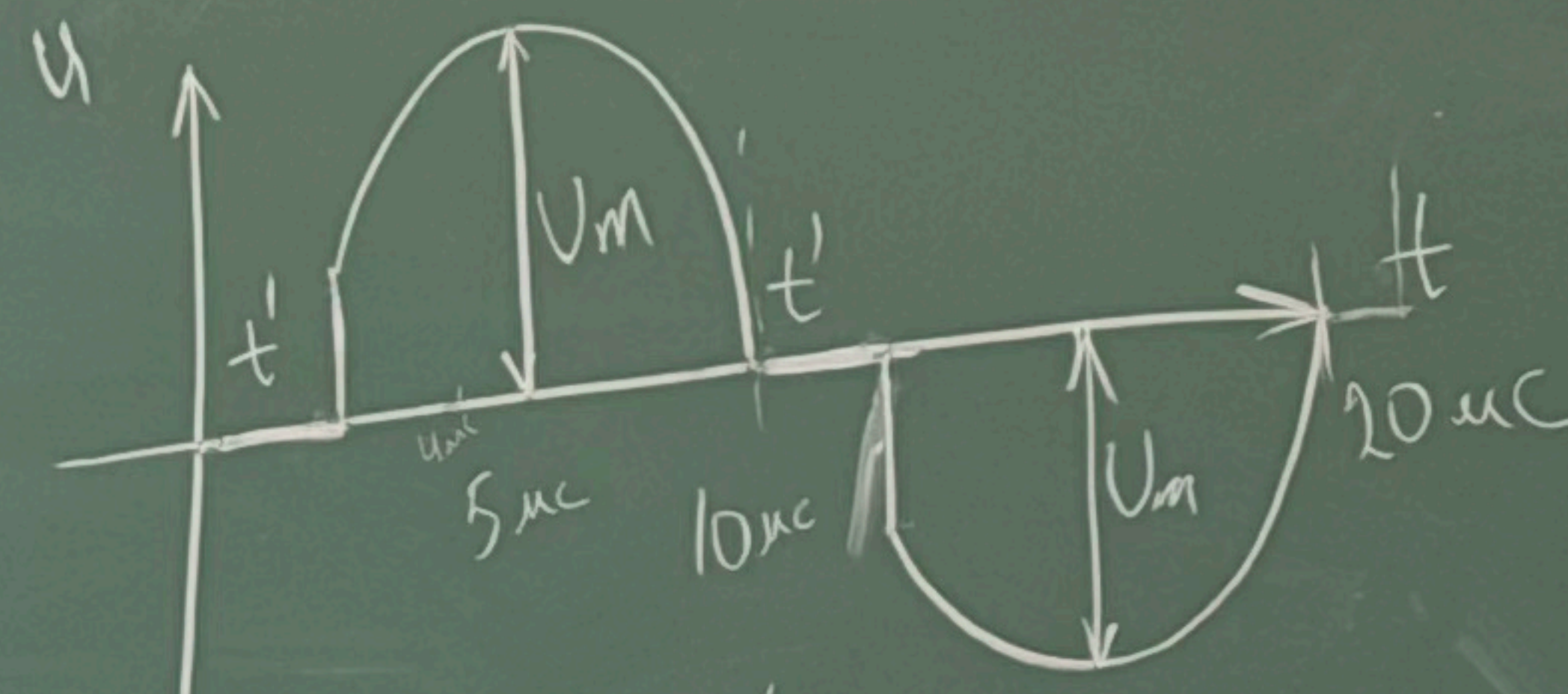
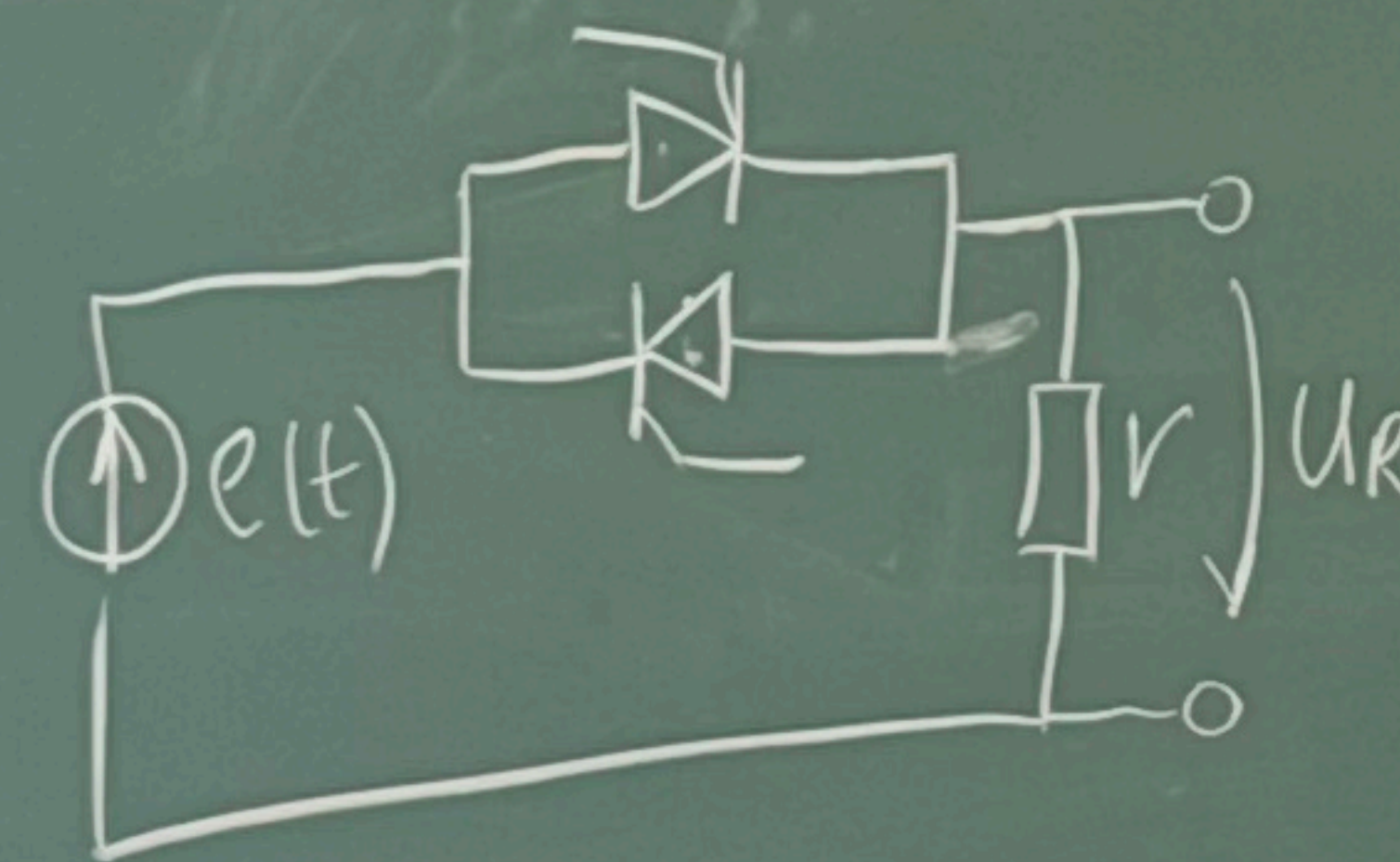
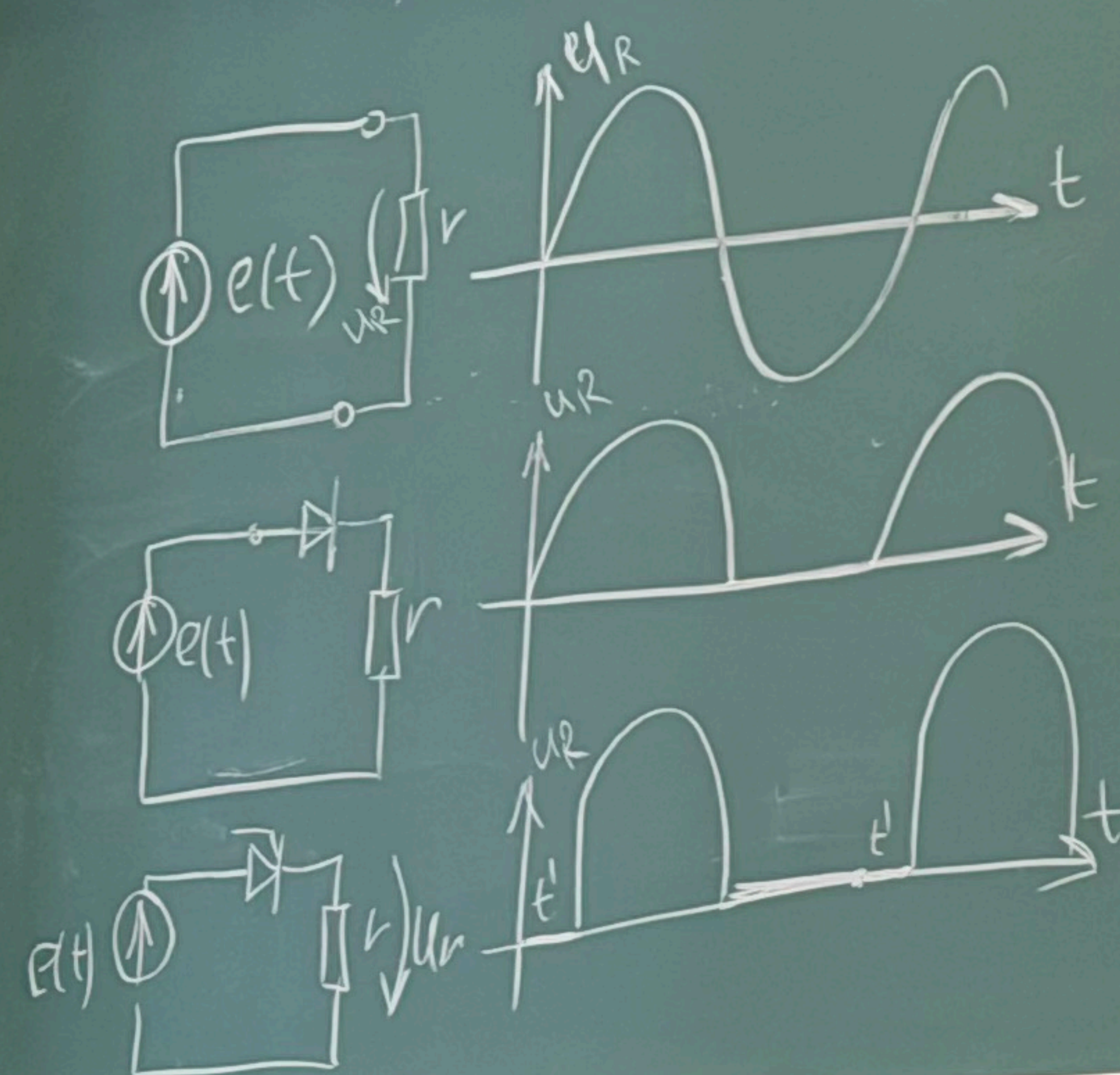
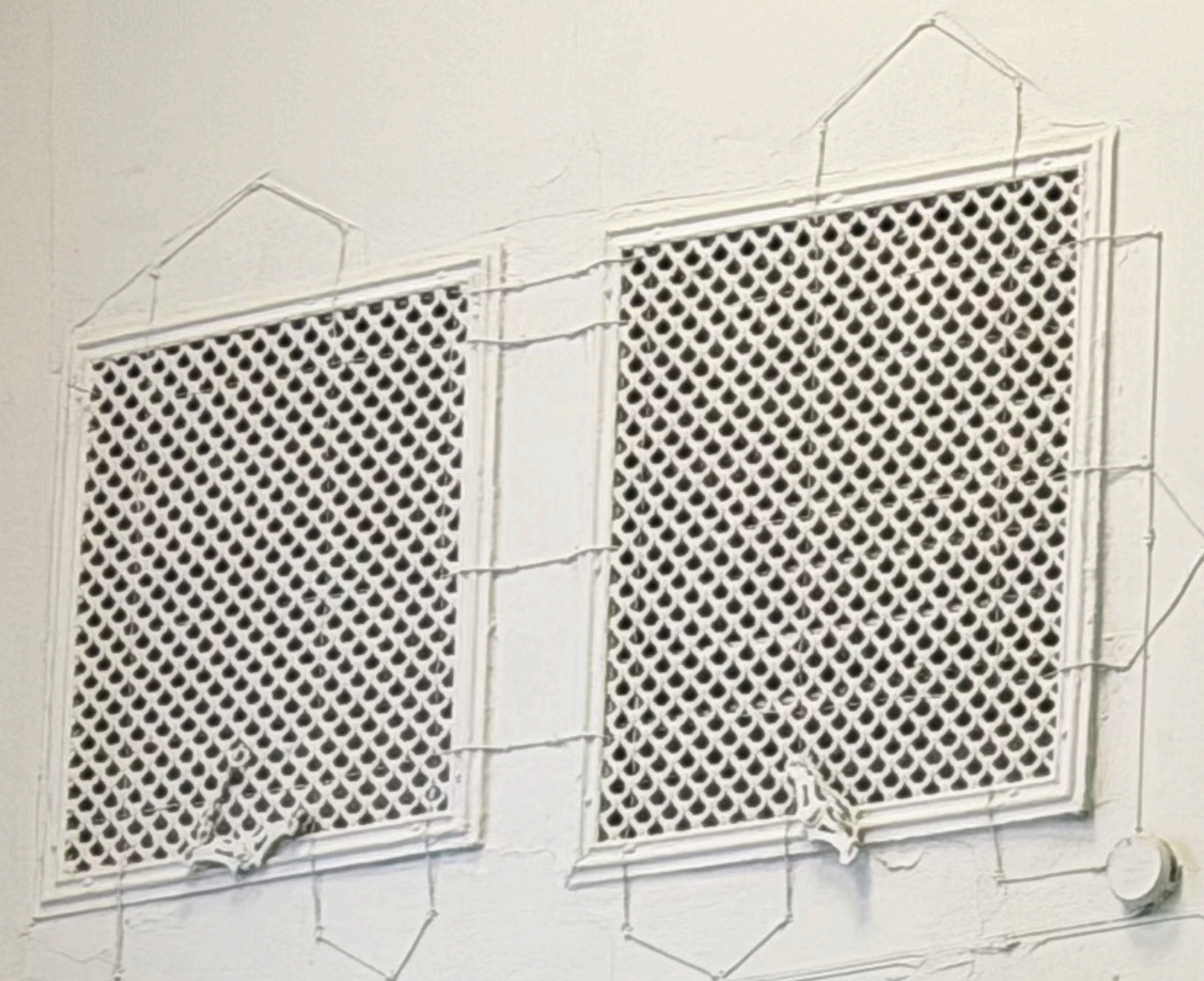
$$\begin{aligned} e(t) &= E_m \sin(\omega t + \psi_e) - \text{мгн. знач-е} \\ \dot{E}_m &= E_m e^{j\psi_e} - \text{компл. узодр.} \end{aligned}$$



$$Z_R = \frac{\dot{U}_R}{\dot{I}_R} = \frac{U_{mR} e^{j\psi_u}}{I_{mR} e^{j\psi_i}} = r e^{j\psi_u - j\psi_i} = r$$

$$Z_L = \frac{\dot{U}_L}{\dot{I}_L} = \frac{U_{mL} e^{j\psi_u}}{I_{mL} e^{j\psi_i}} = X_L e^{j(\psi_u - \psi_i)} = X_L e^{j\frac{\pi}{2}} = jX_L$$

$$Z_C = \frac{\dot{U}_C}{\dot{I}_C} = \frac{U_{mC} e^{j\psi_u}}{I_{mC} e^{j\psi_i}} = X_C e^{j\psi_c} = X_C e^{-j\frac{\pi}{2}} = -jX_C$$



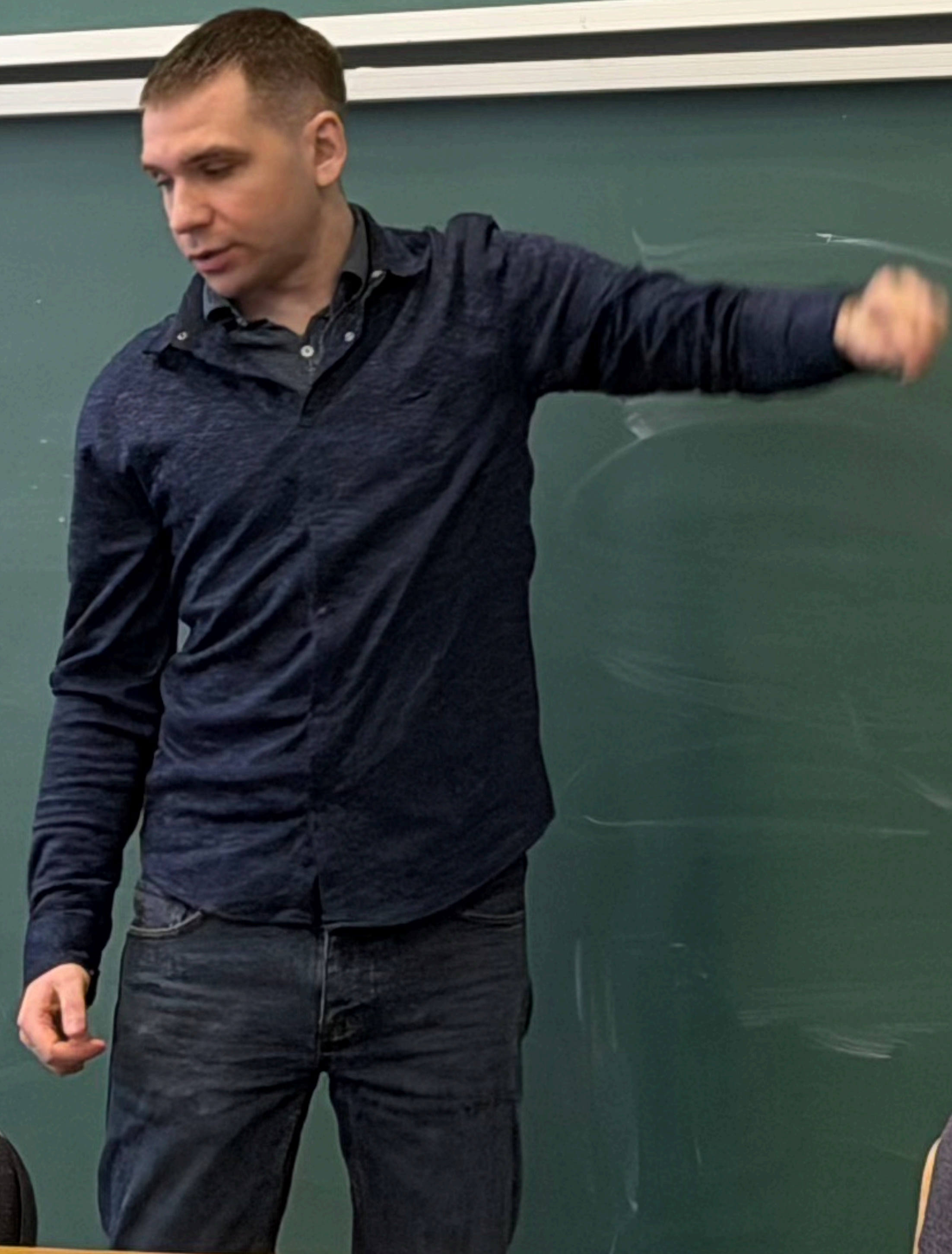
$$u(t) = \begin{cases} 0, & t < t' \\ U_m \sin(\omega t), & t' < t < \frac{T}{2} \\ 0, & \frac{T}{2} < t < \frac{T}{2} + t' \\ U_m \sin(\omega t), & \frac{T}{2} + t' < t < T \end{cases}$$

t' [1-4 μs]
 U_m

$$f = 50 \text{ Hz}$$

$$\omega = 2\pi f = 314 \frac{\text{rad}}{\text{s}}$$

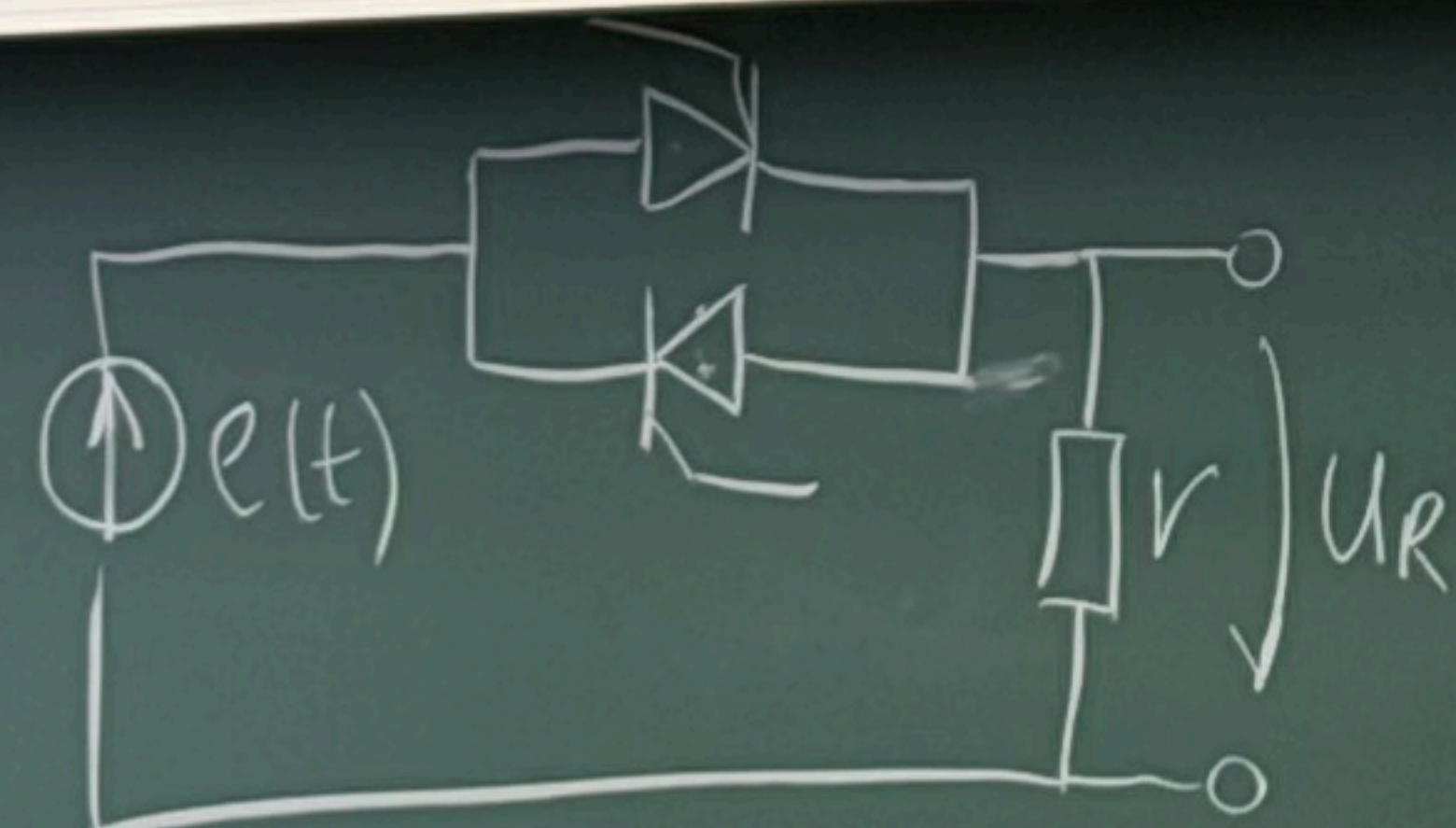
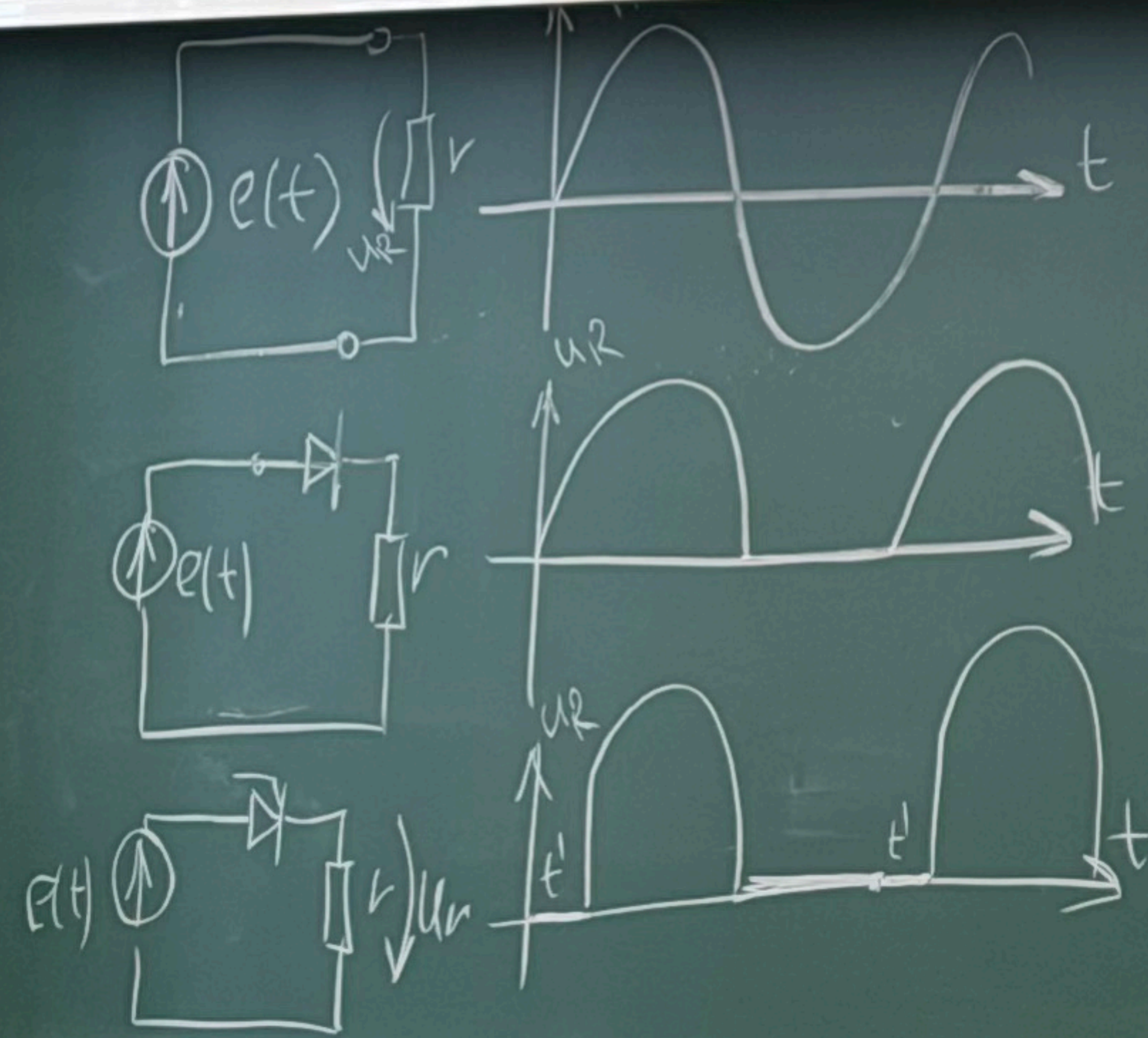
$$T = \frac{1}{f} = 20 \text{ μs}$$



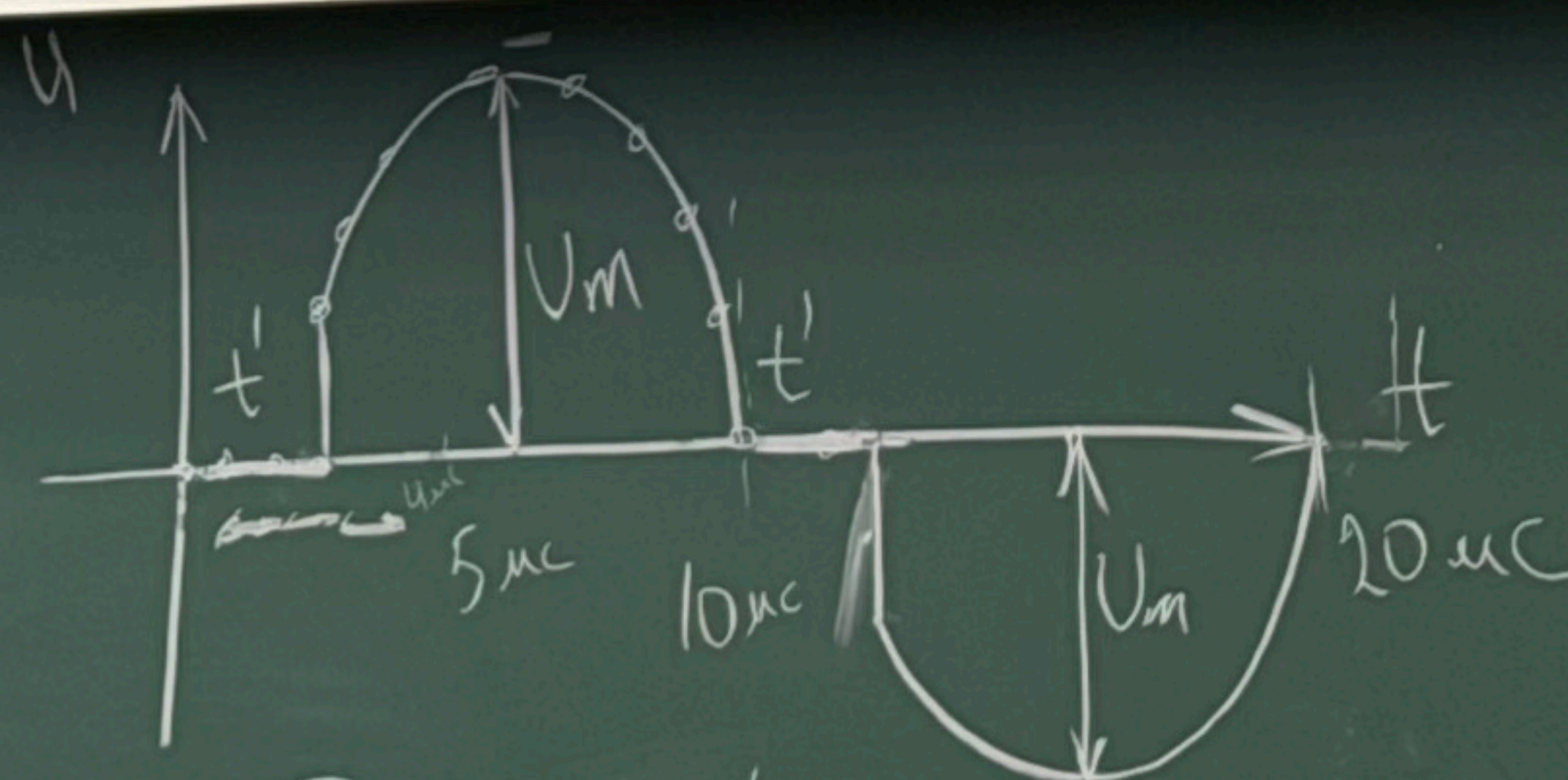
$$U(t) = \underbrace{U_0}_{\text{пост. сост.}} + \underbrace{U_{1s} \sin(\omega t) + U_{1c} \cos(\omega t)}_{1-\text{я гармоника}} + \underbrace{U_{2s} \sin(2\omega t) + U_{2c} \cos(2\omega t)}_{2-\text{я гармоника}} + \dots + \underbrace{U_{ks} \sin(k\omega t) + U_{kc} \cos(k\omega t)}_{k-\text{я гармоника}}$$

$$U(t) = U_0 + U_1 \sin(\omega t + \varphi_1) + U_2 \sin(2\omega t + \varphi_2) + \dots + U_k \sin(k\omega t + \varphi_k)$$

$$U(t) = U_1 \sin(\omega t + \varphi_1) + U_3 \sin(3\omega t + \varphi_3) + U_5 \sin(5\omega t + \varphi_5) + U_7 \sin(7\omega t + \varphi_7) + U_9 \sin(9\omega t + \varphi_9) + U_{11} \sin(11\omega t + \varphi_{11})$$



$$U_d = \begin{bmatrix} \dots \\ \dots \end{bmatrix} \quad \text{22-е Точка}$$



$$U(t) = \begin{cases} 0, & t < t' \\ U_m \sin(\omega t), & t' < t < \frac{T}{2} \\ 0, & \frac{T}{2} < t < \frac{T}{2} + t' \\ U_m \sin(\omega t), & \frac{T}{2} + t' < t < T \end{cases}$$

$$\begin{aligned} U_m & \\ K & [1-11] \\ f &= 50 \text{ Гц} \\ \omega &= 2\pi f = 314 \frac{\text{рад}}{\text{с}} \\ T &= \frac{1}{f} = 20 \text{ мс} \end{aligned}$$