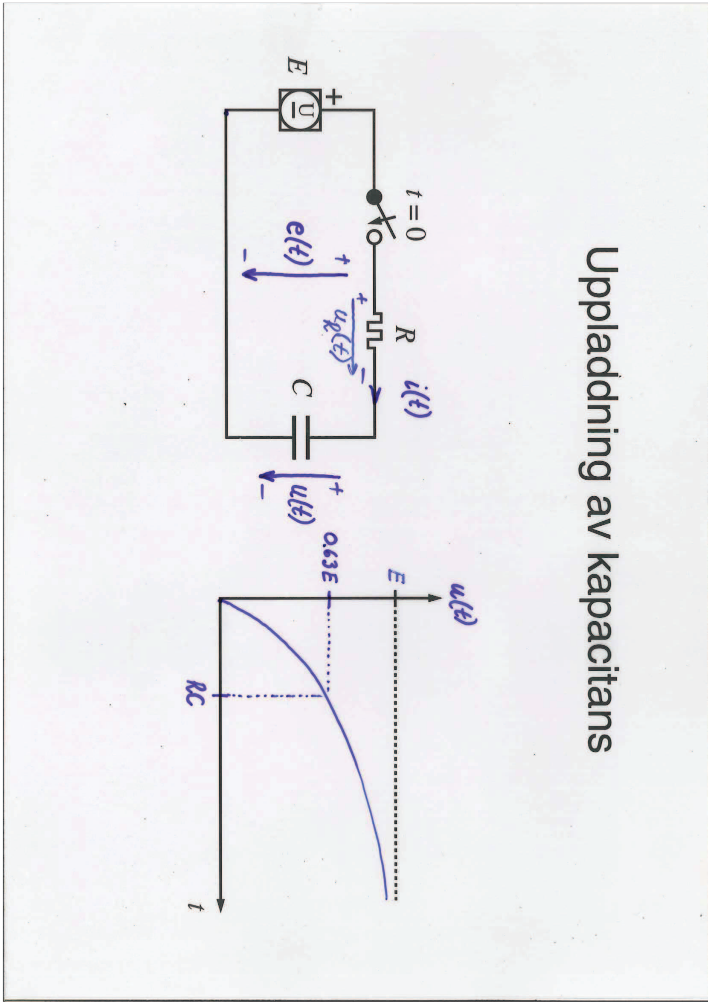
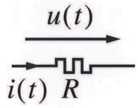


Växelströmsteori

Tidsberoende storheter:

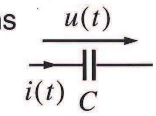
Spänning	$u(t)$
Ström	$i(t)$
Effekt	$p(t)$

Resistans



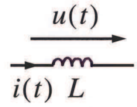
$$u(t) = Ri(t)$$

Kapacitans



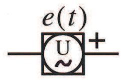
$$i(t) = C\frac{d}{dt}u(t)$$

Induktans

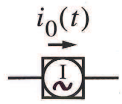


$$u(t) = L\frac{d}{dt}i(t)$$

Ideal spänningskälla

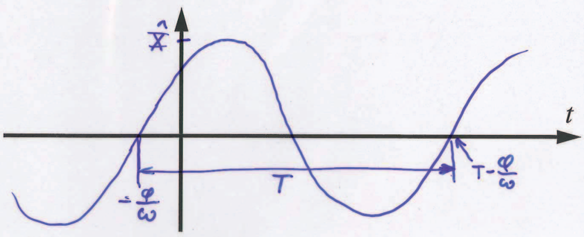


Ideal strömkälla



Stationär sinussignal

$$x(t) = \hat{X}\sin(\omega t + \varphi)$$



$x(t)$	momentanvärde	φ	fasvinkel
$\hat{X}$	amlitud (toppvärde)	T	periodtid
ω	vinkelfrekvens	f	frekvens

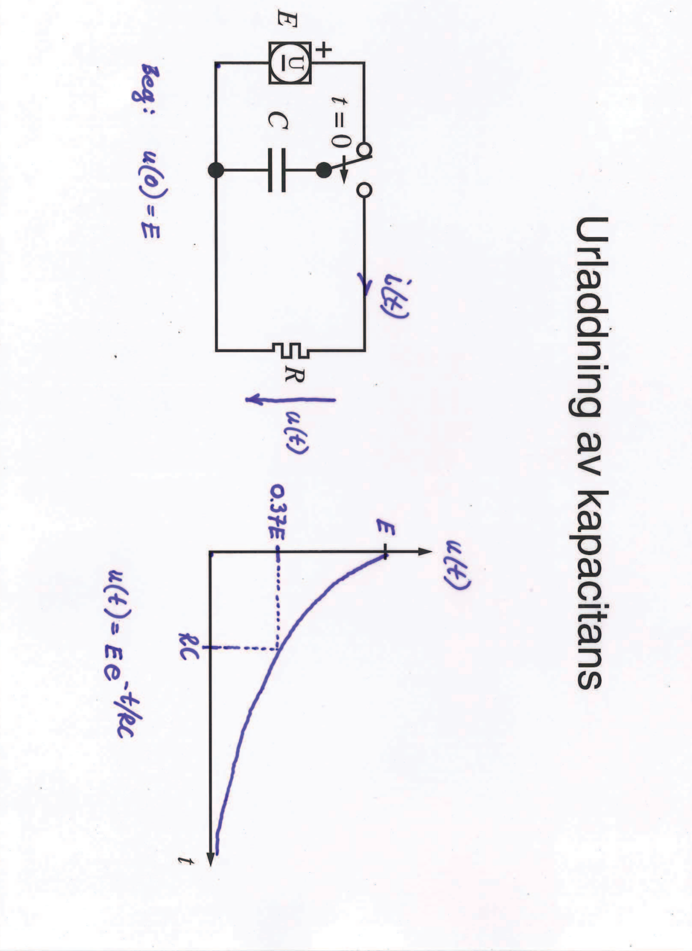
Samband: $f = \frac{1}{T}$

$\omega = 2\pi f$

Momentan effekt: $p(t) = u(t)i(t)$

Aktiv effekt: $P = \frac{1}{T}\int_0^T p(t)dt$

Effektivvärde: $X_e = \sqrt{\frac{1}{T}\int_0^T x^2(t)dt} = \frac{\hat{X}}{\sqrt{2}}$ Sinus



$j\omega$-metoden

1. Ersätt strömmar, spänningar och källor med deras komplexa motsvarigheter:

$$a(t) = \hat{A}\sin(\omega t + \varphi) \Rightarrow$$

$$A = \hat{A}e^{j\varphi} = b + jc$$

$$b = \hat{A}\cos\varphi \qquad c = \hat{A}\sin\varphi$$

2. Ersätt R, L, C med deras impedanser:

$$Z_L = j\omega L \qquad Z_C = \frac{1}{j\omega C} \qquad Z_R = R$$

3. Lös problemet med likströmsteori.

4. Gör omvändningen till punkt 1:

$$A = \hat{A}e^{j\varphi} = b + jc \Rightarrow$$

$$a(t) = \hat{A}\sin(\omega t + \varphi)$$

$$\hat{A} = \sqrt{b^2 + c^2}$$

$$\varphi = arg(b + jc) = \text{atan}\frac{c}{b} \qquad (\pm\pi)$$

Om $b < 0$