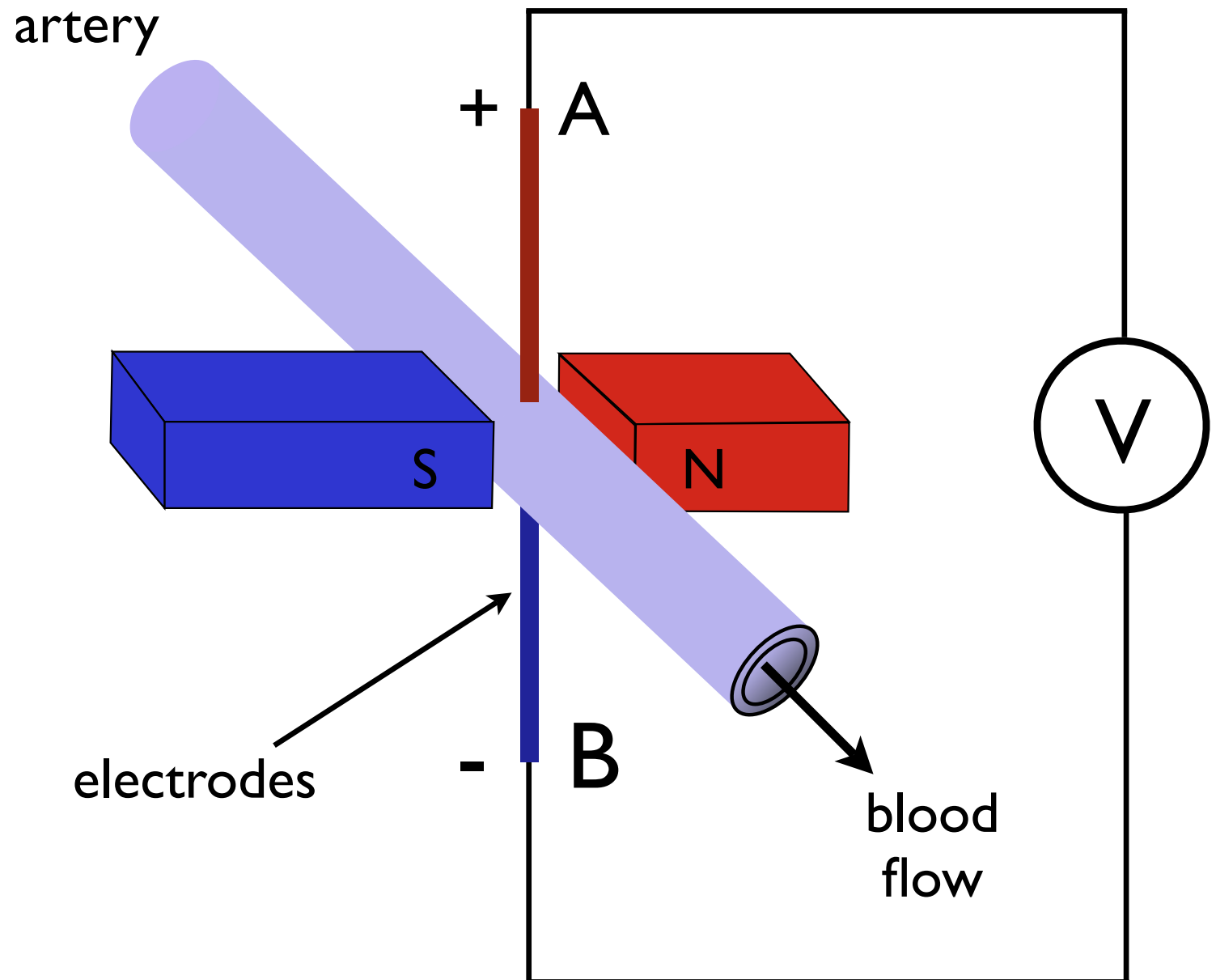
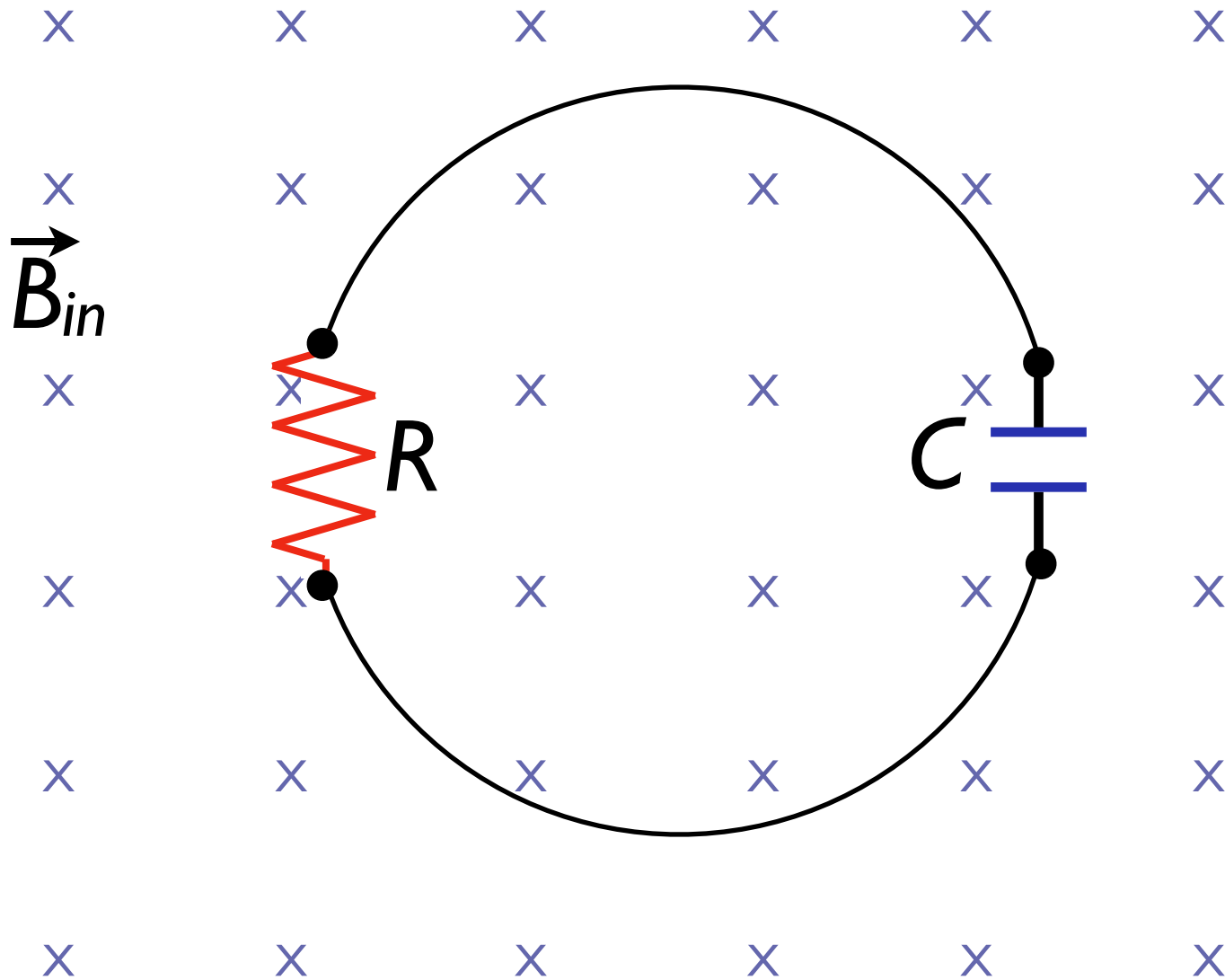


measuring liquid flow using motionally-induced voltage

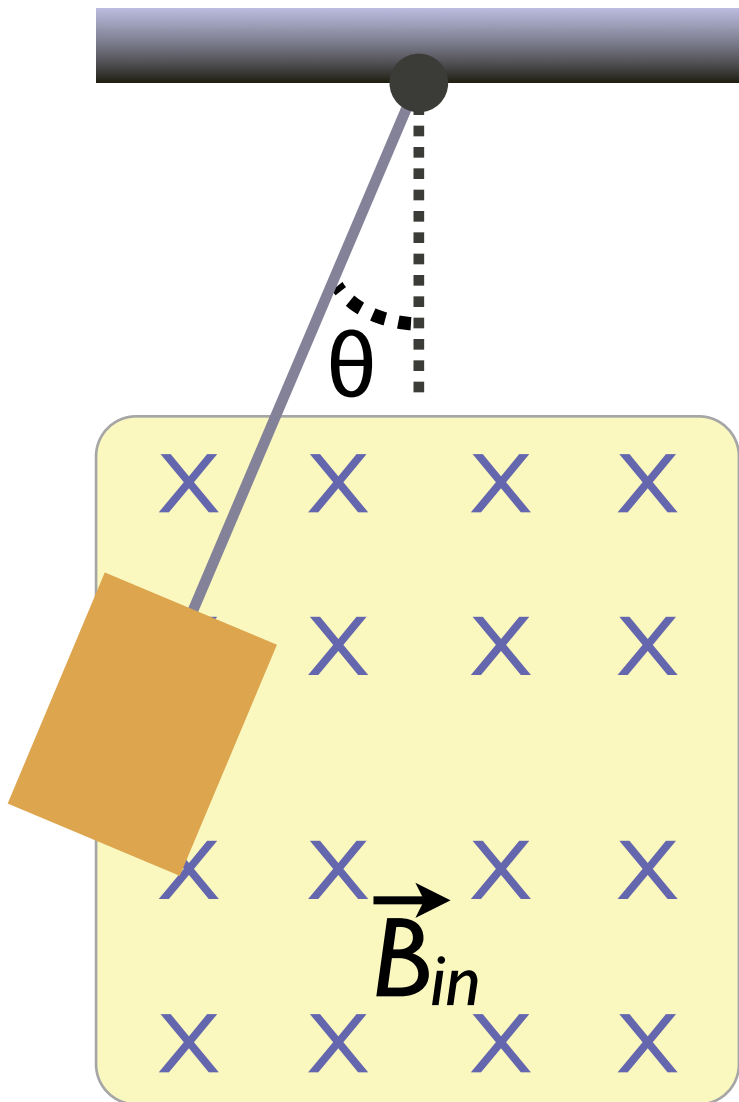


which plate of C is positive?

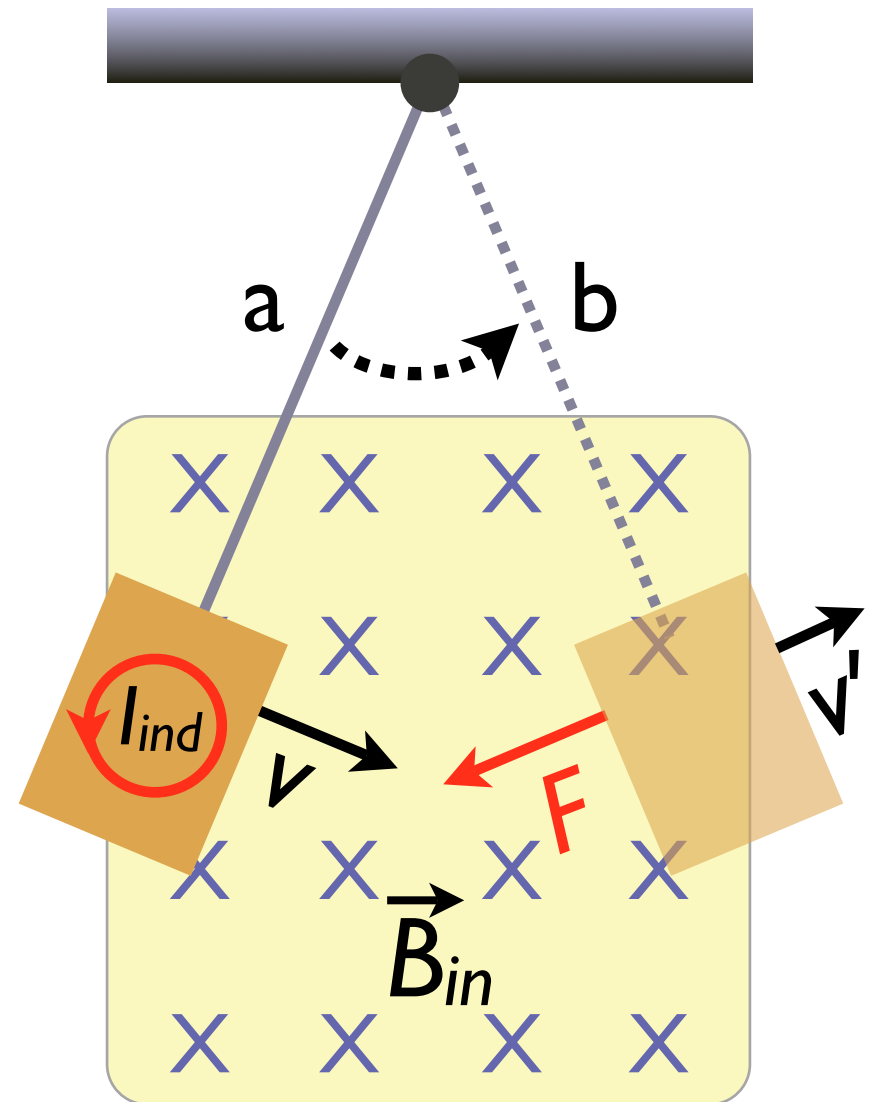


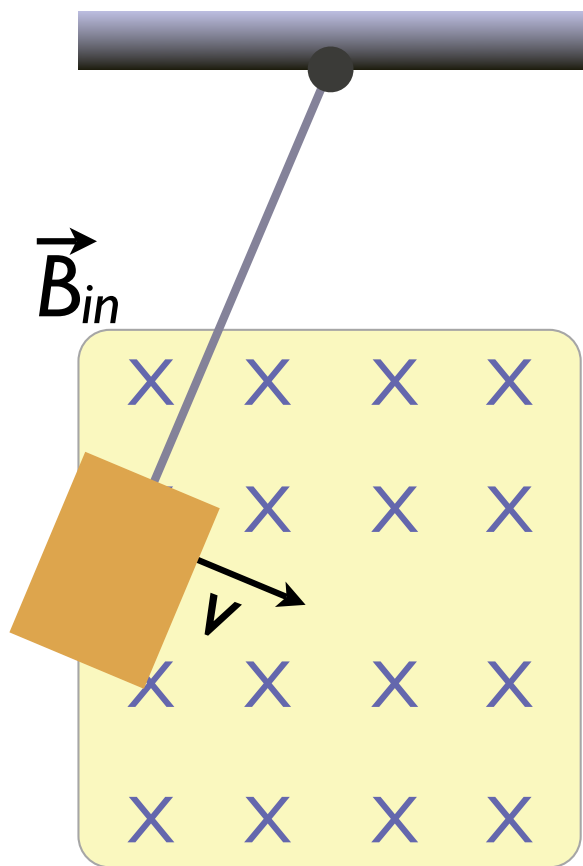
Magnetic braking ('eddy current' braking)

(a)

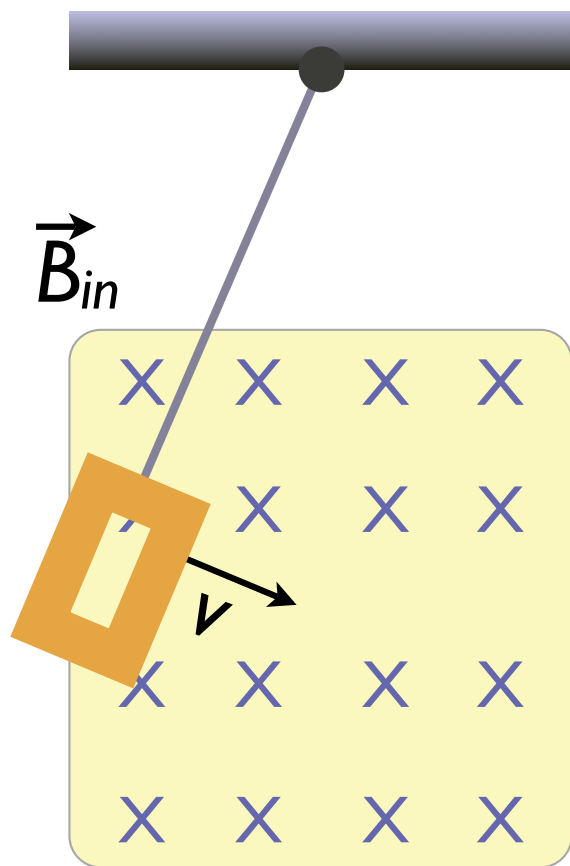


(b)

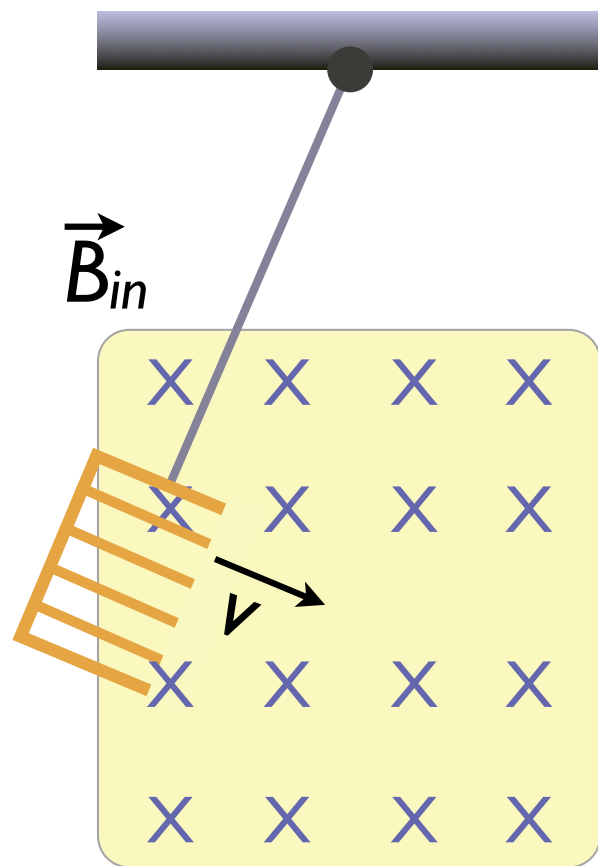




(a)



(b)



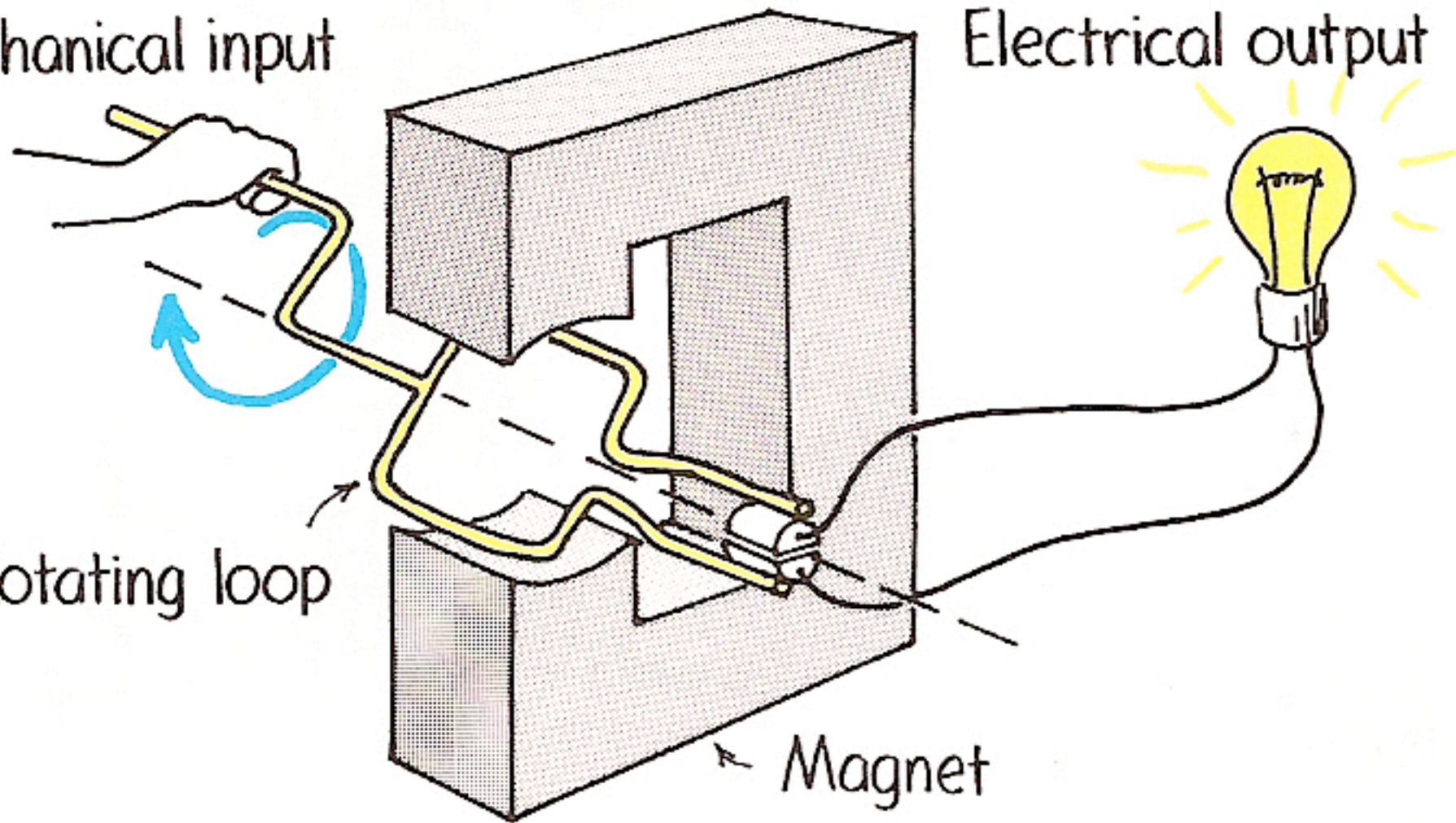
(c)

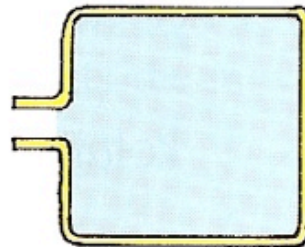
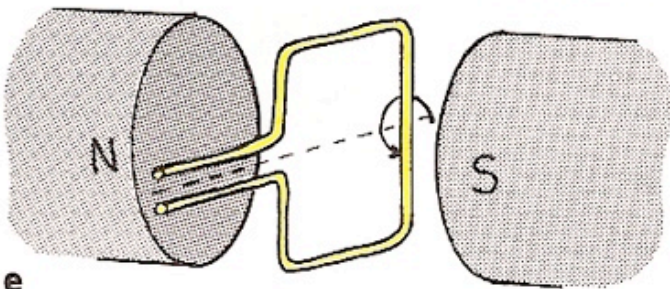
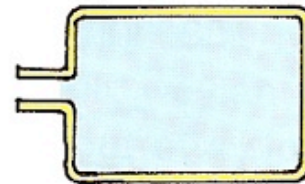
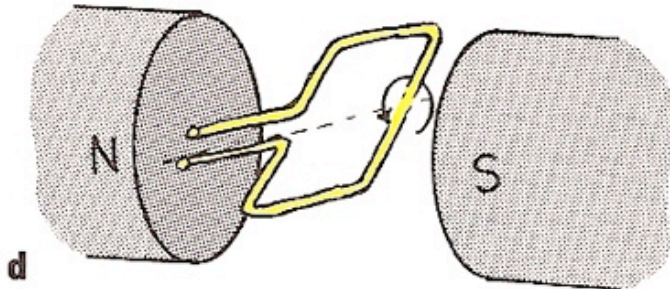
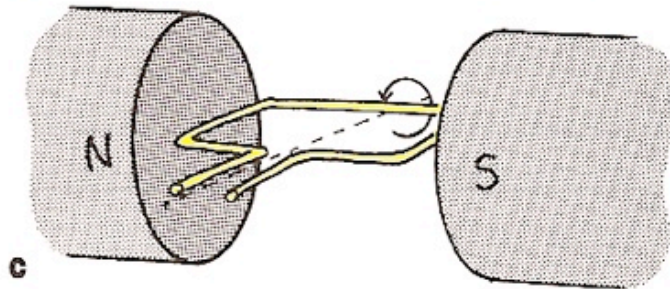
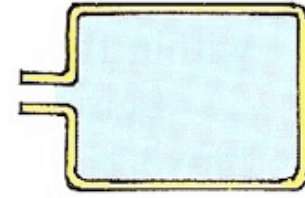
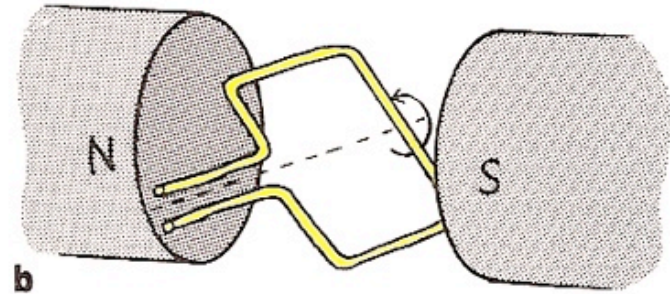
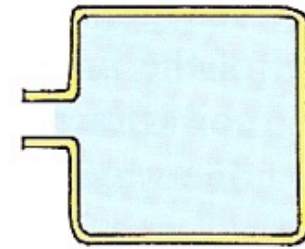
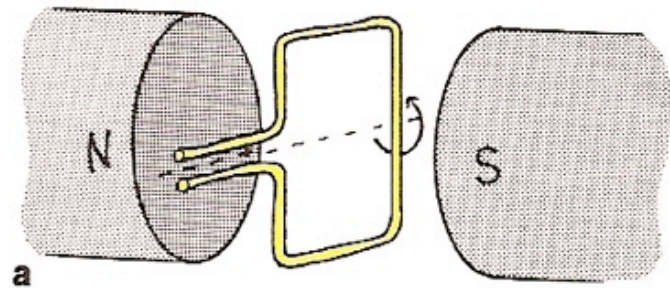
Mechanical input

Electrical output

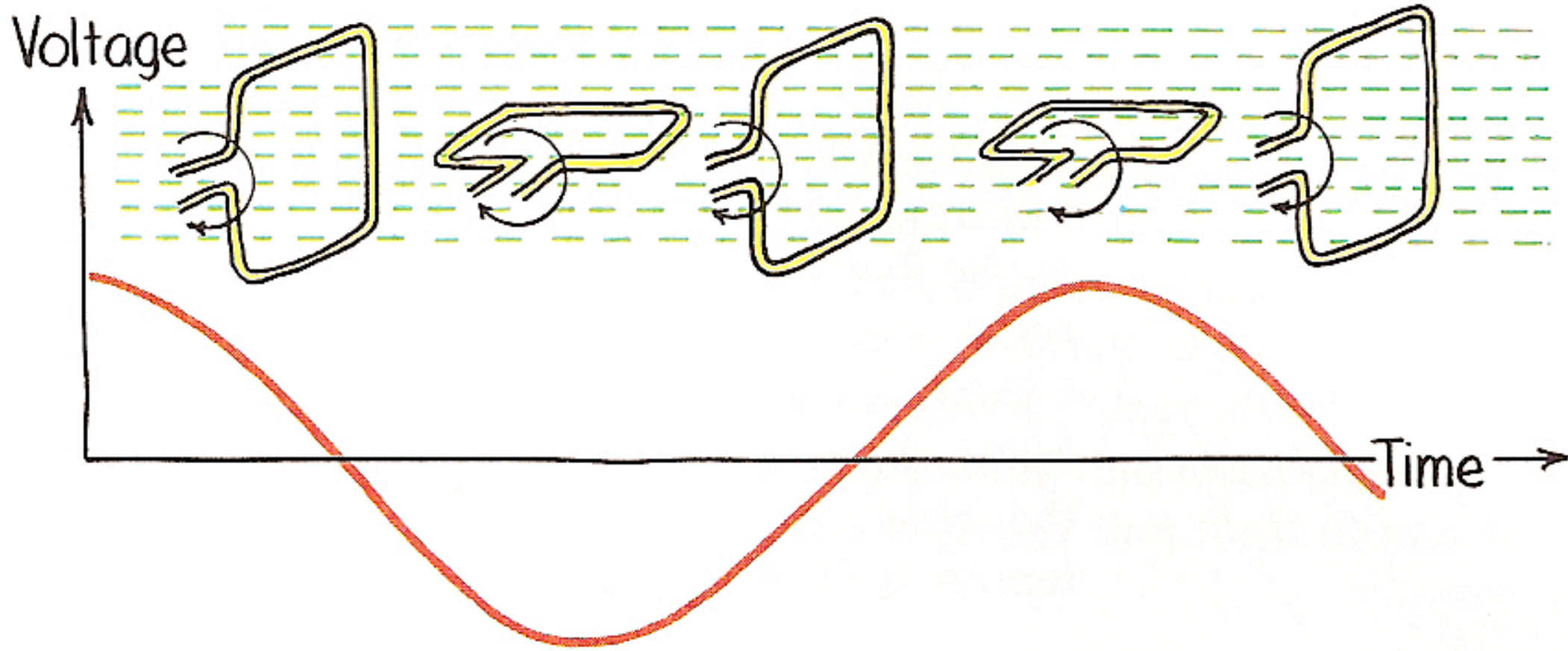
Rotating loop

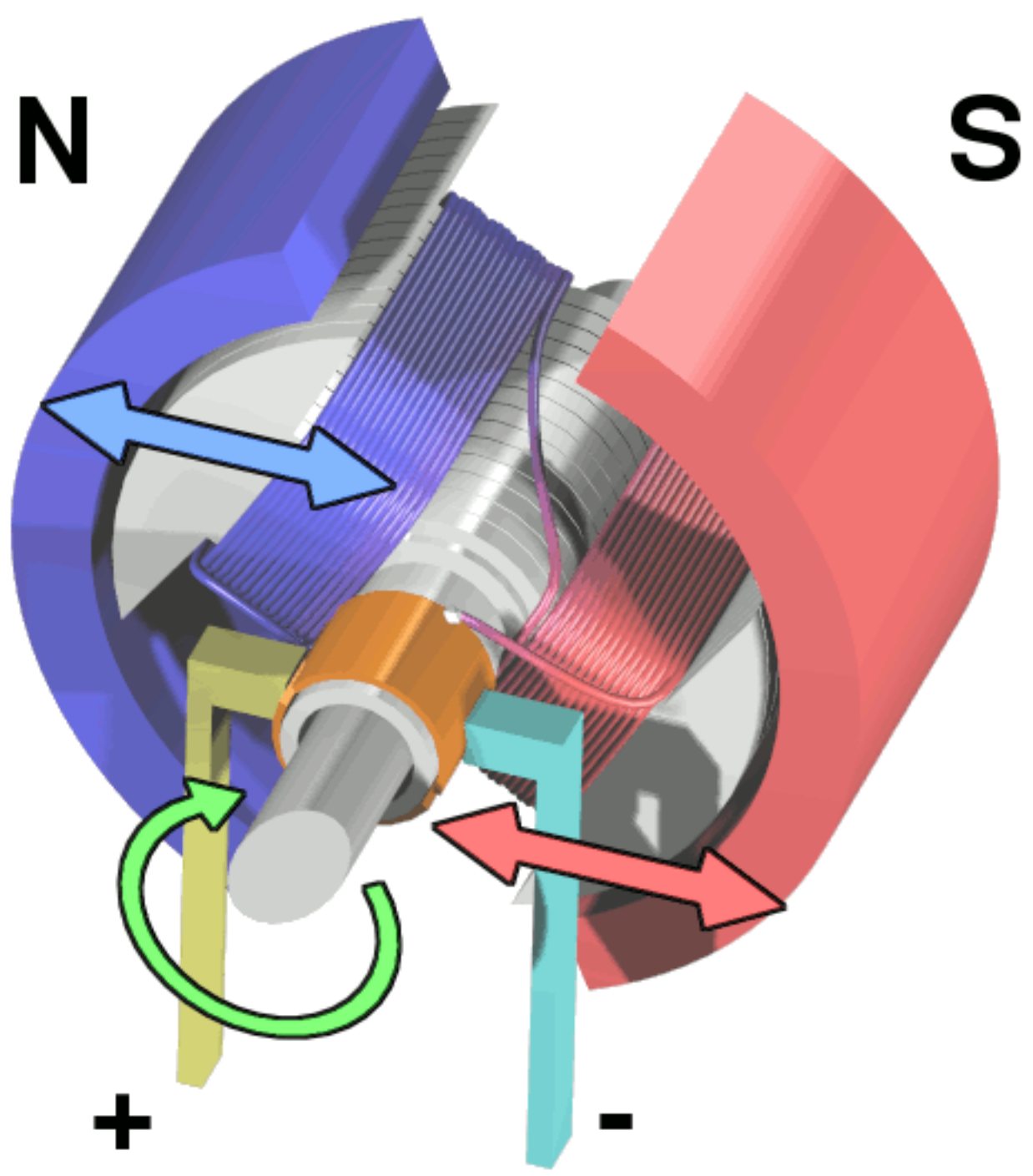
Magnet

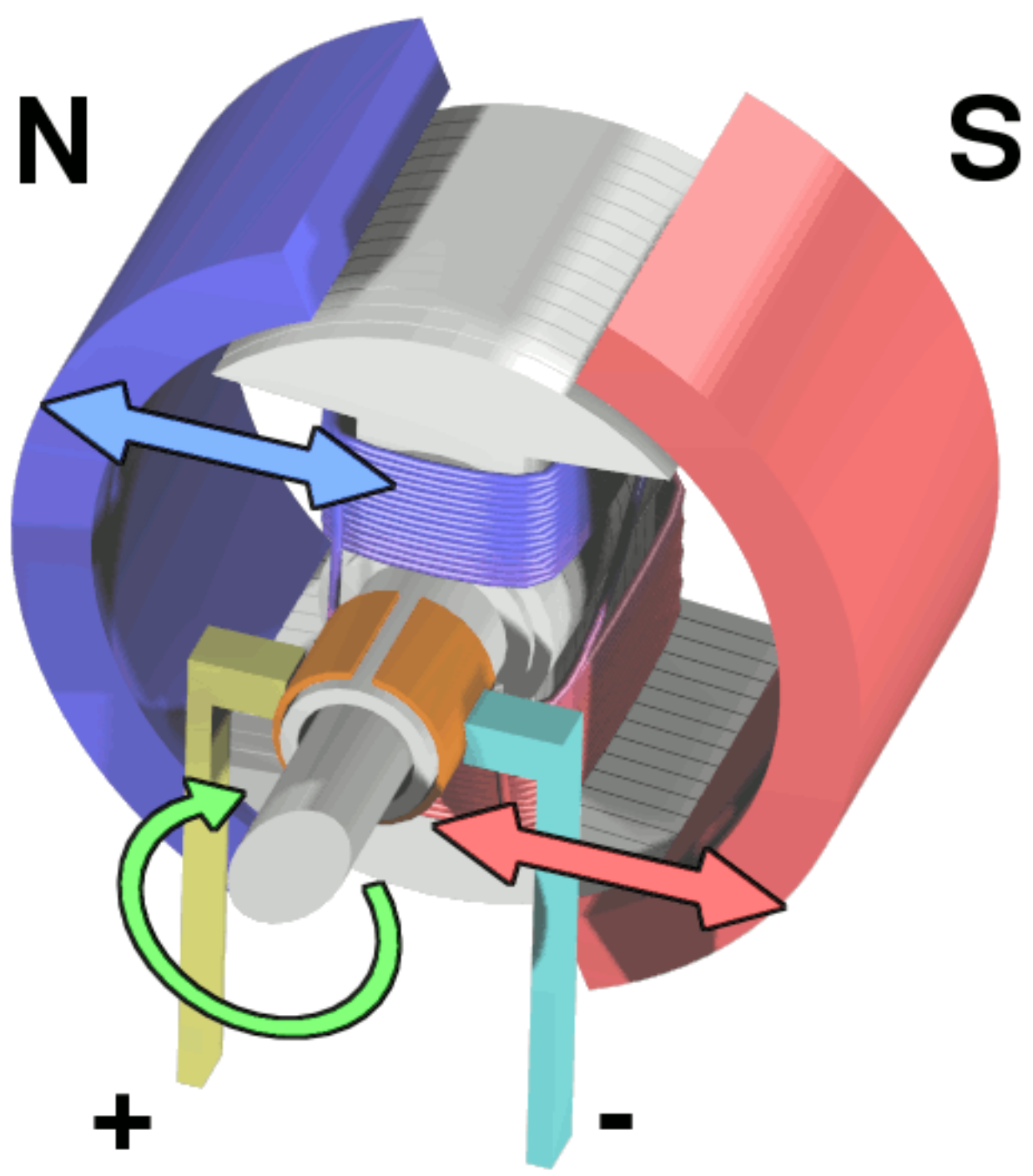


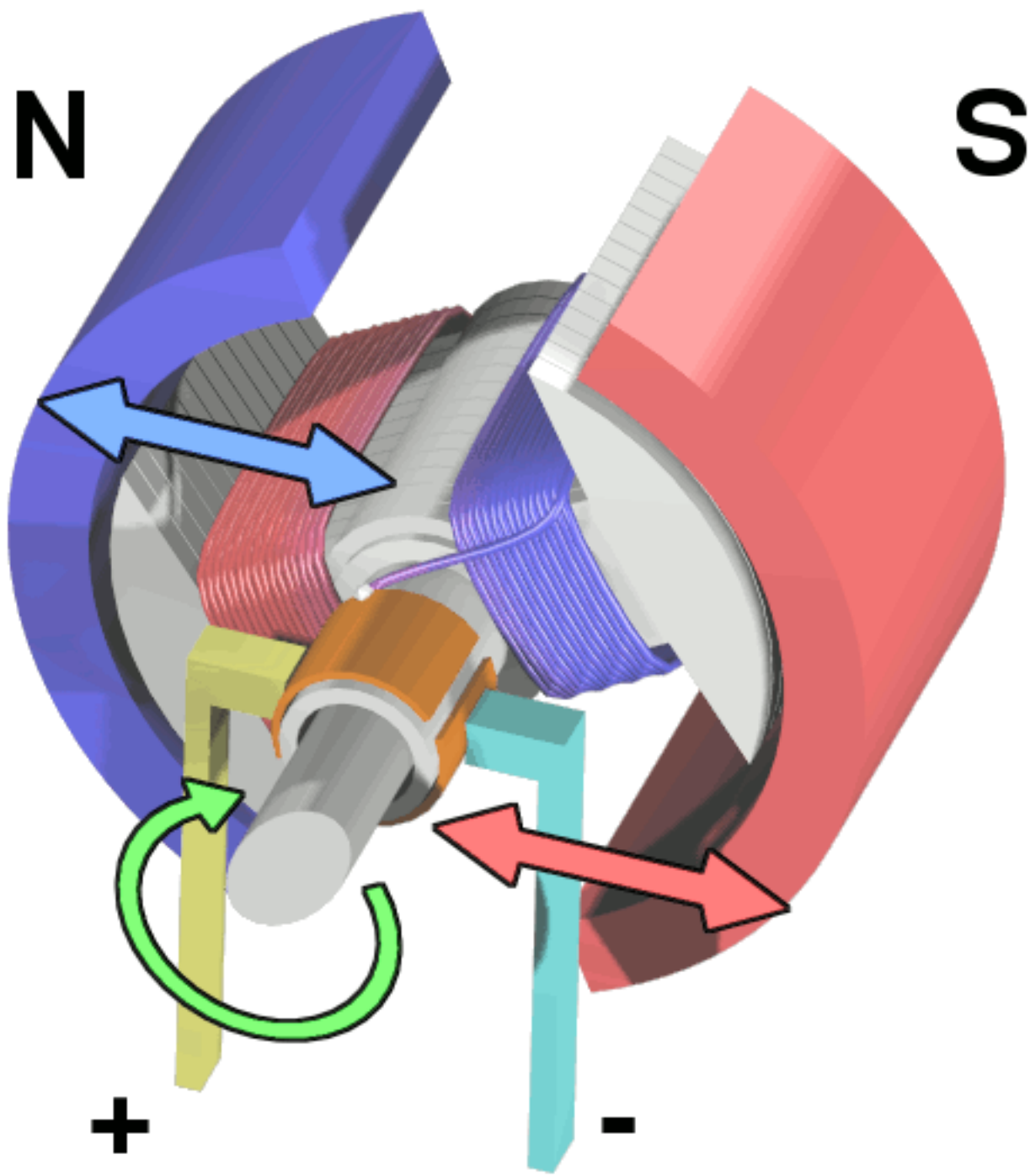


Effective area and field within loop at different rotational angles



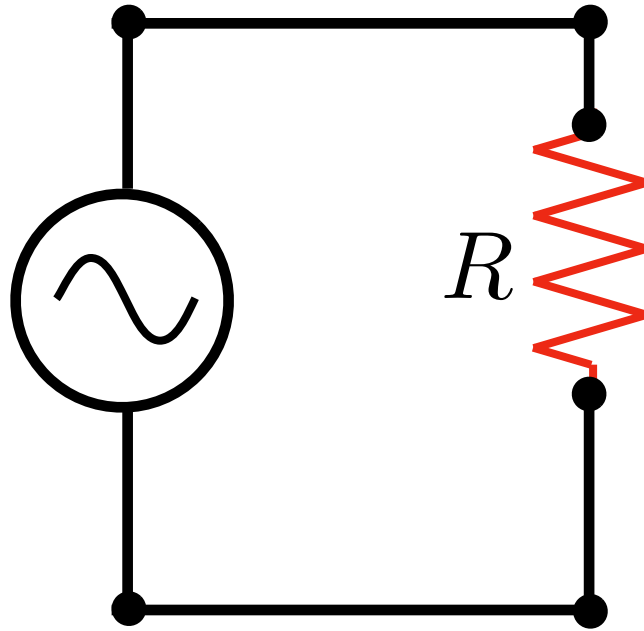




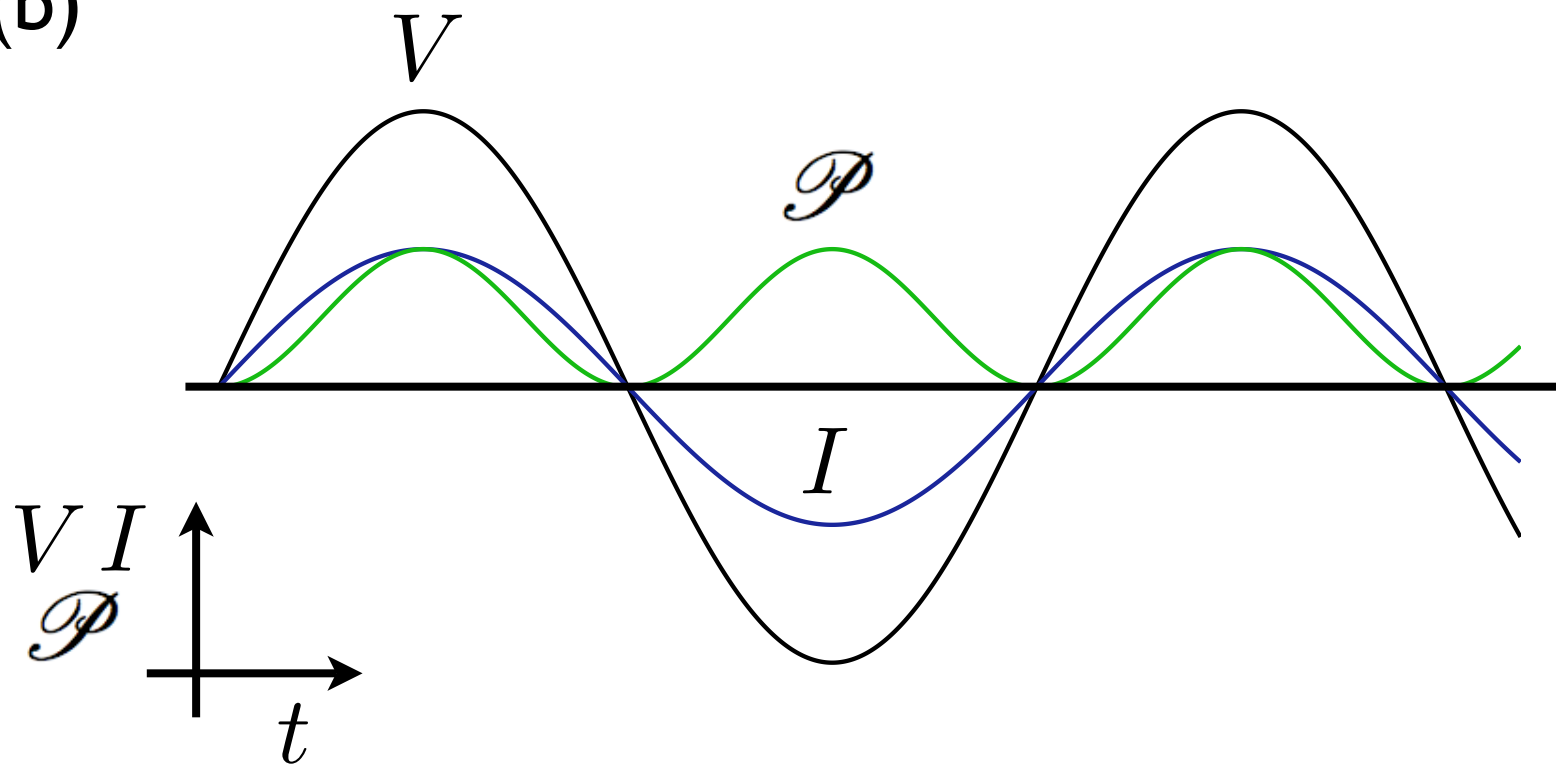


(a)

$$V \propto V_0 \sin \omega t$$

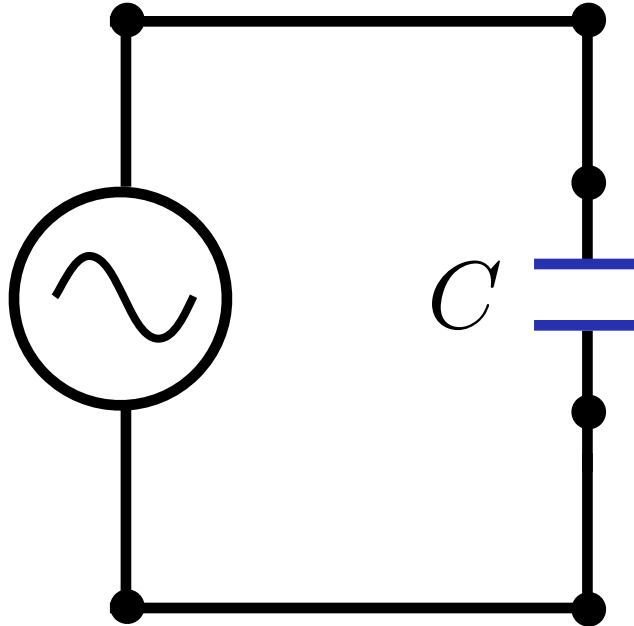


(b)

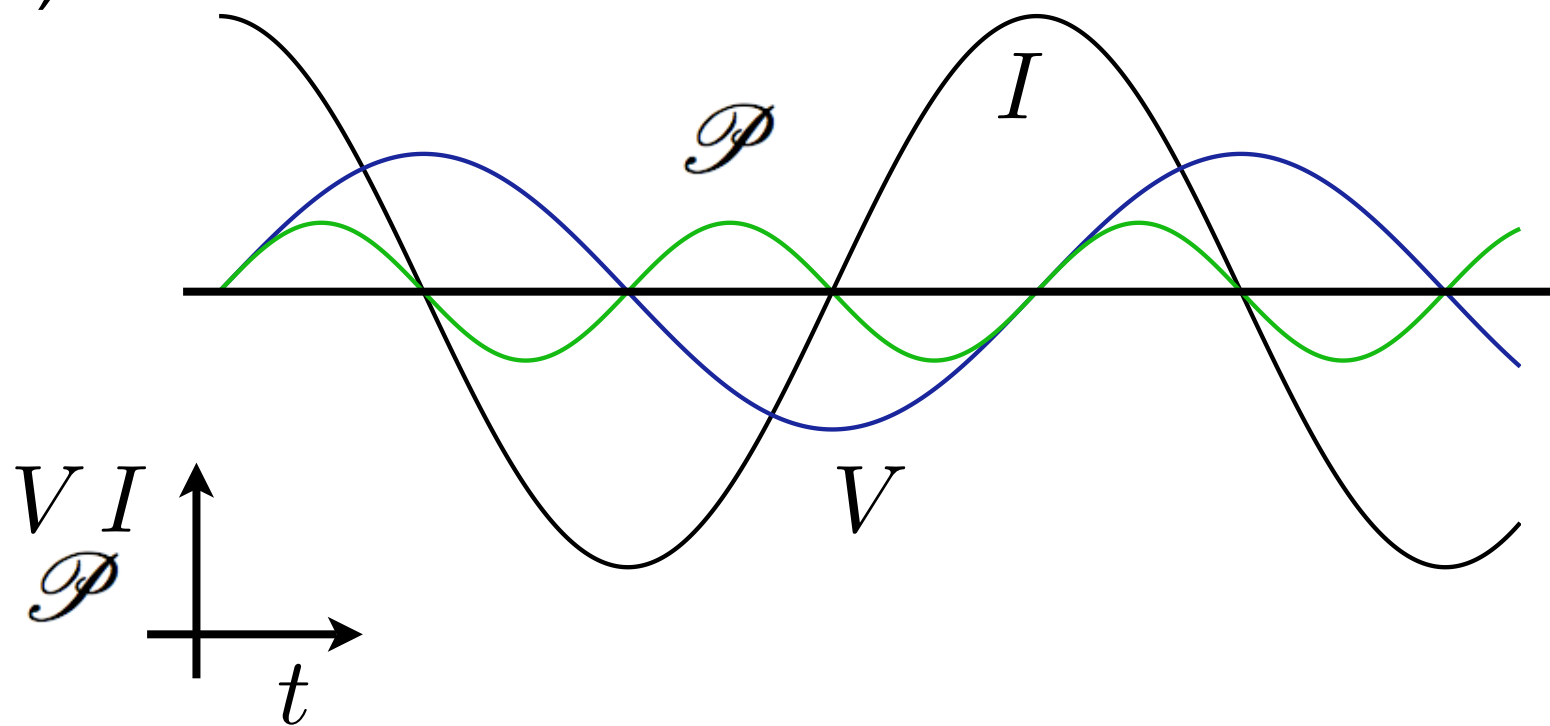


(a)

$$V \propto V_0 \sin \omega t$$

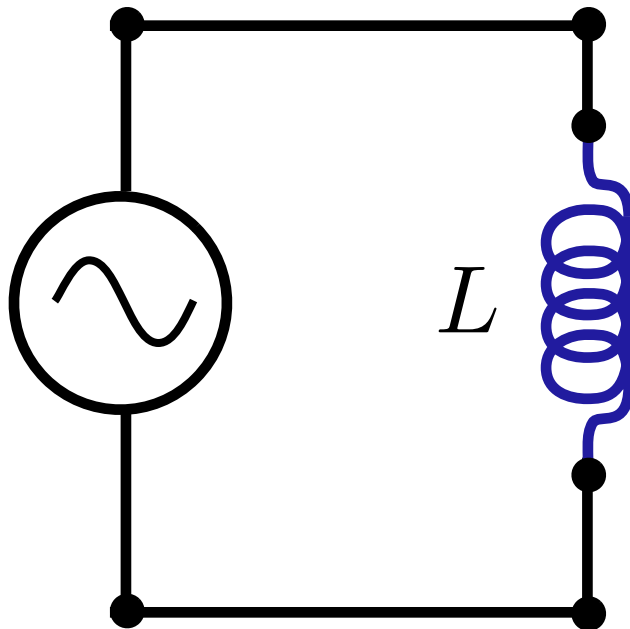


(b)

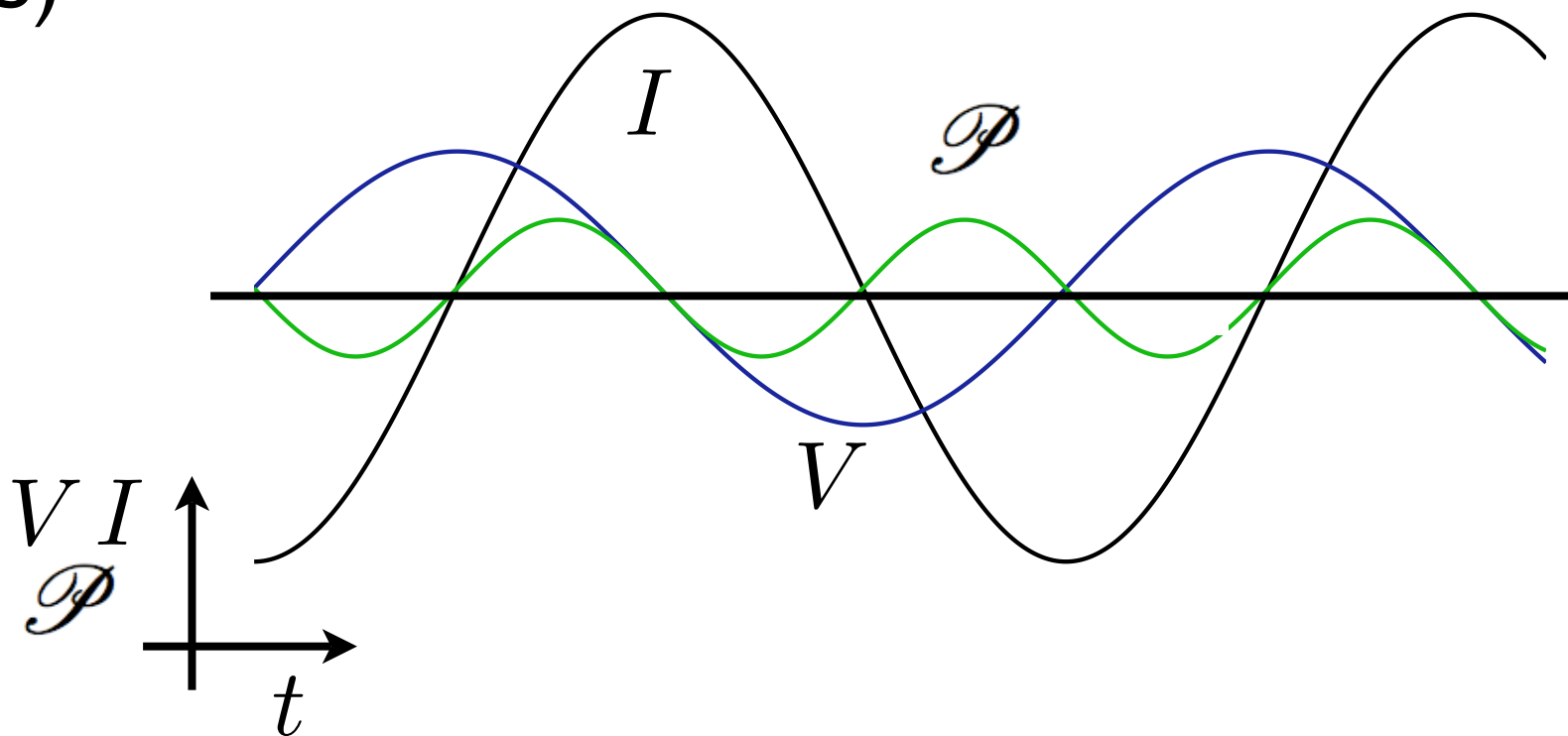


(a)

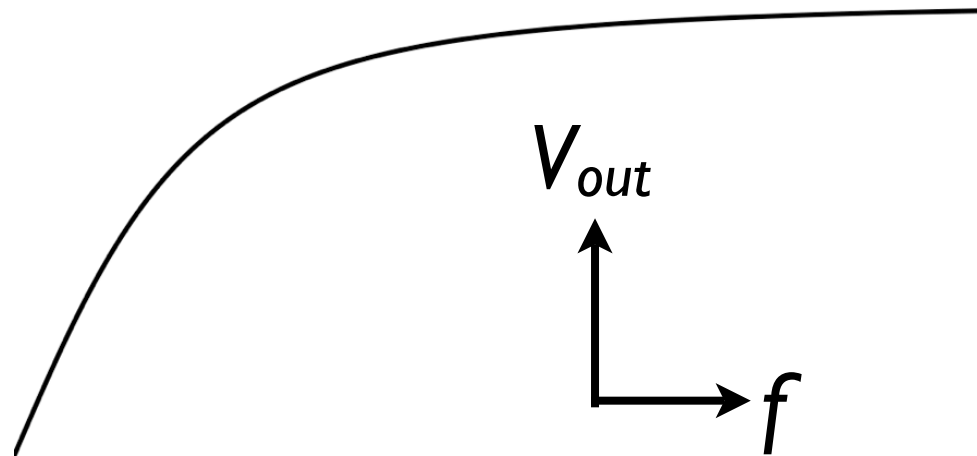
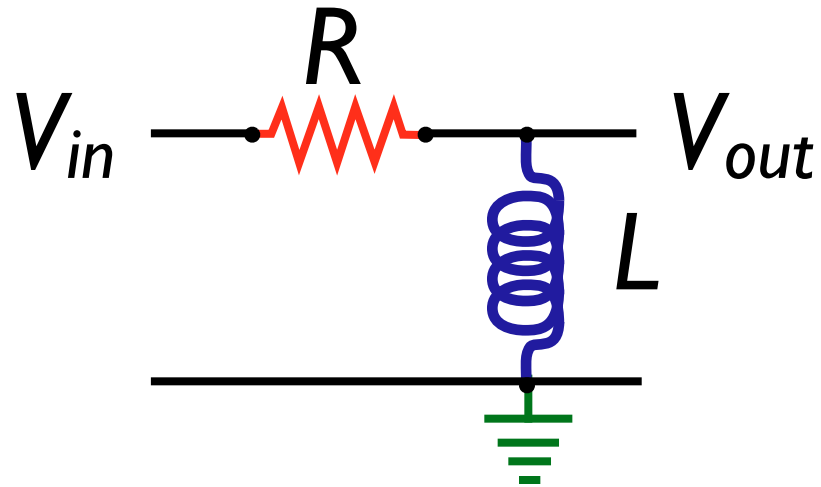
$$V \propto V_0 \sin \omega t$$



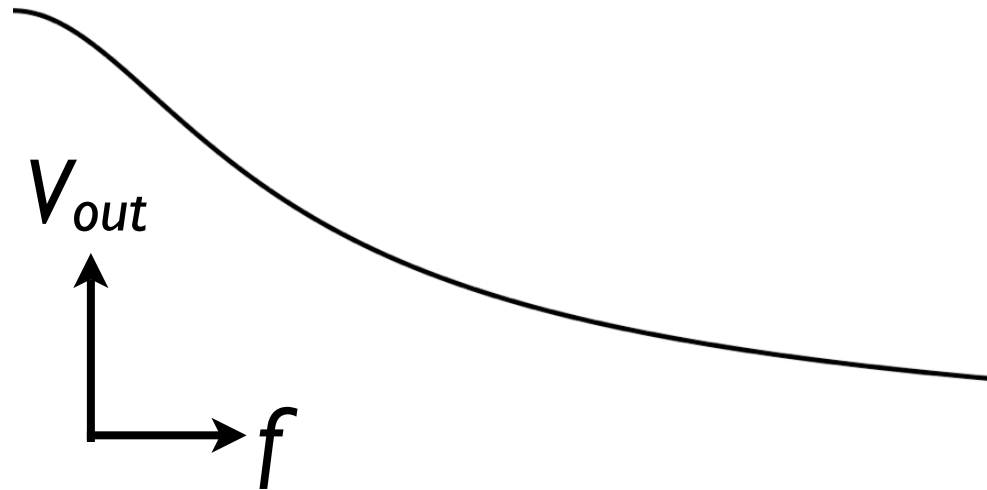
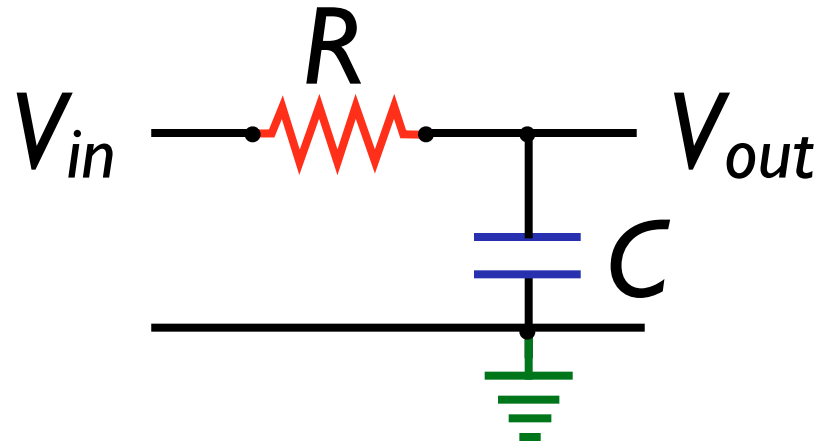
(b)

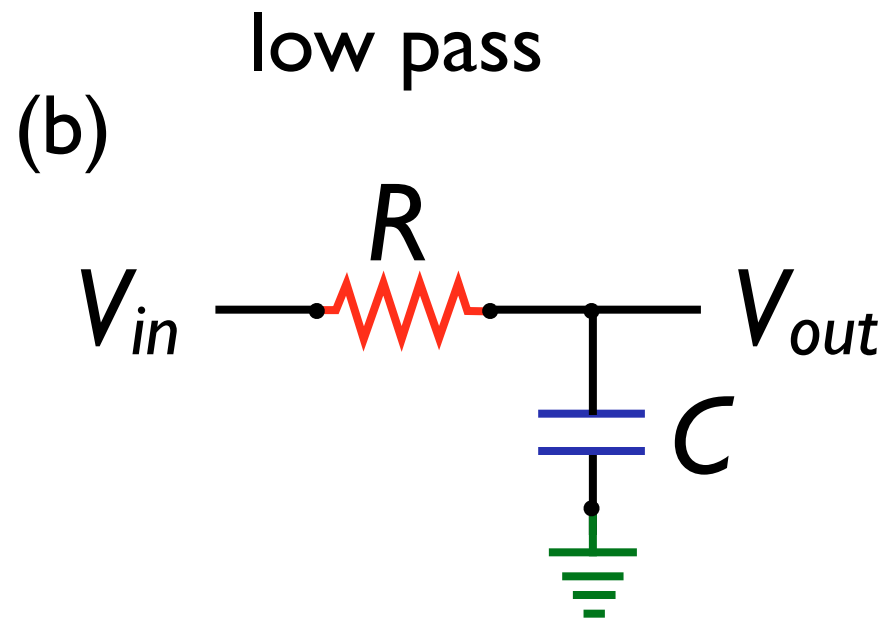
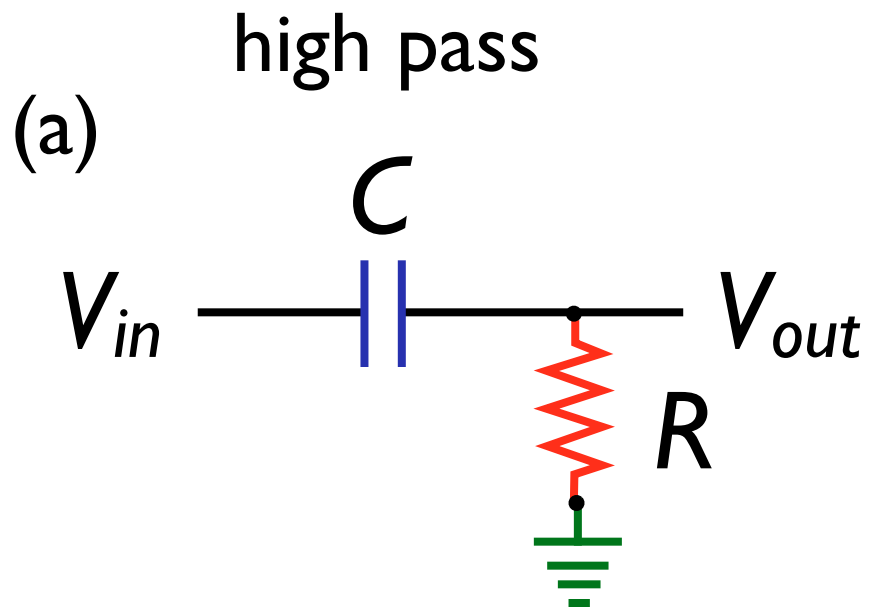


high-pass

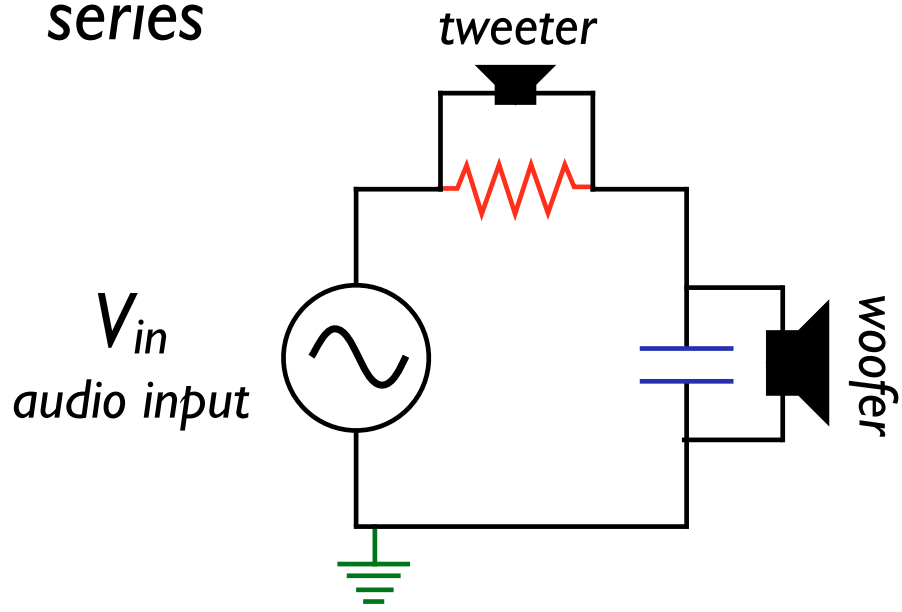


low-pass

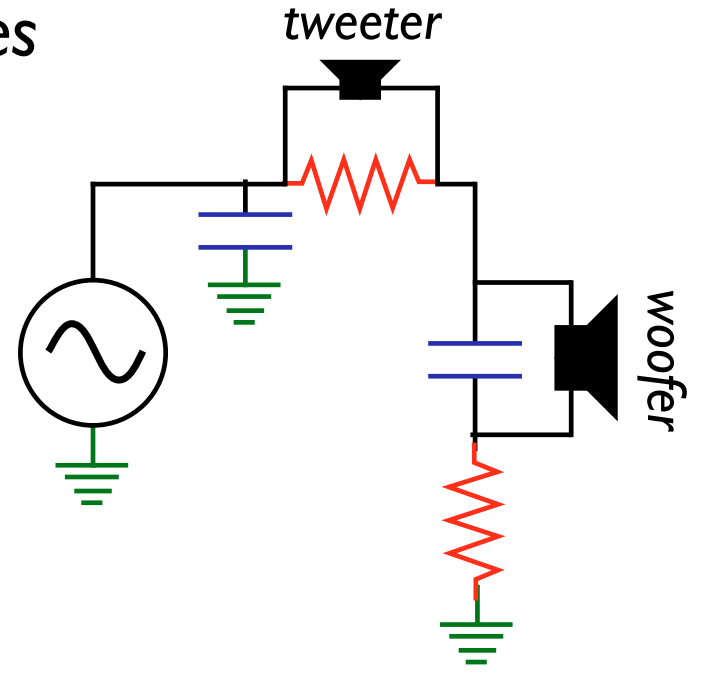




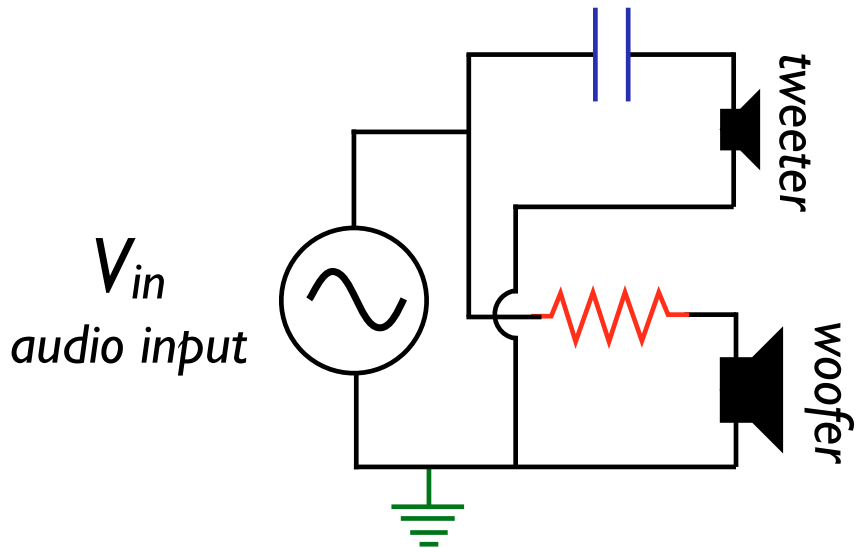
series



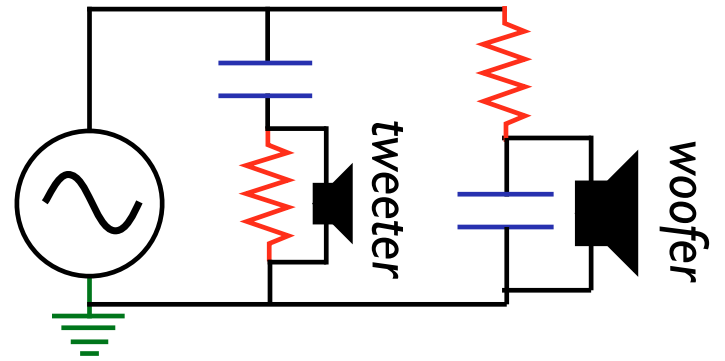
series

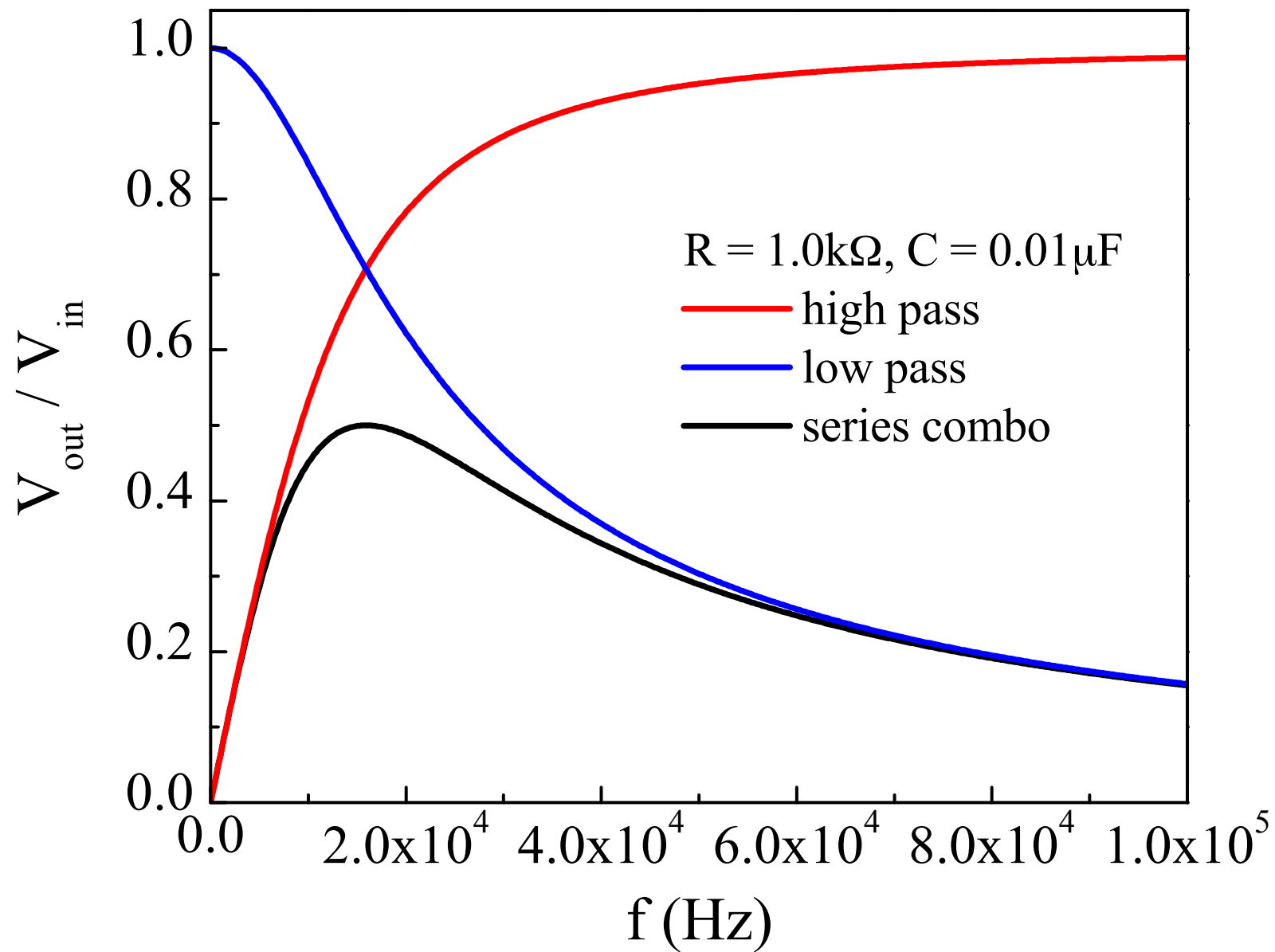


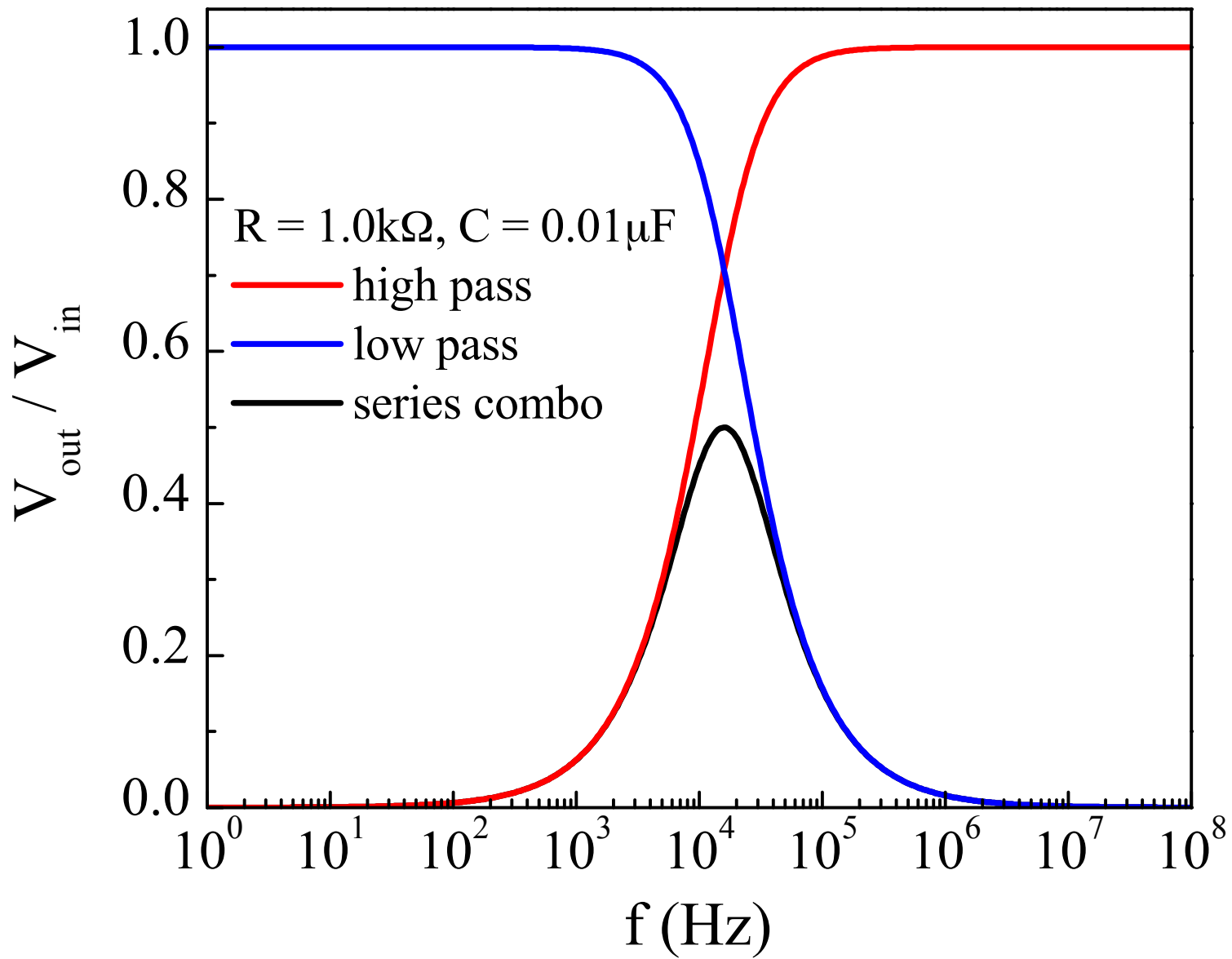
parallel

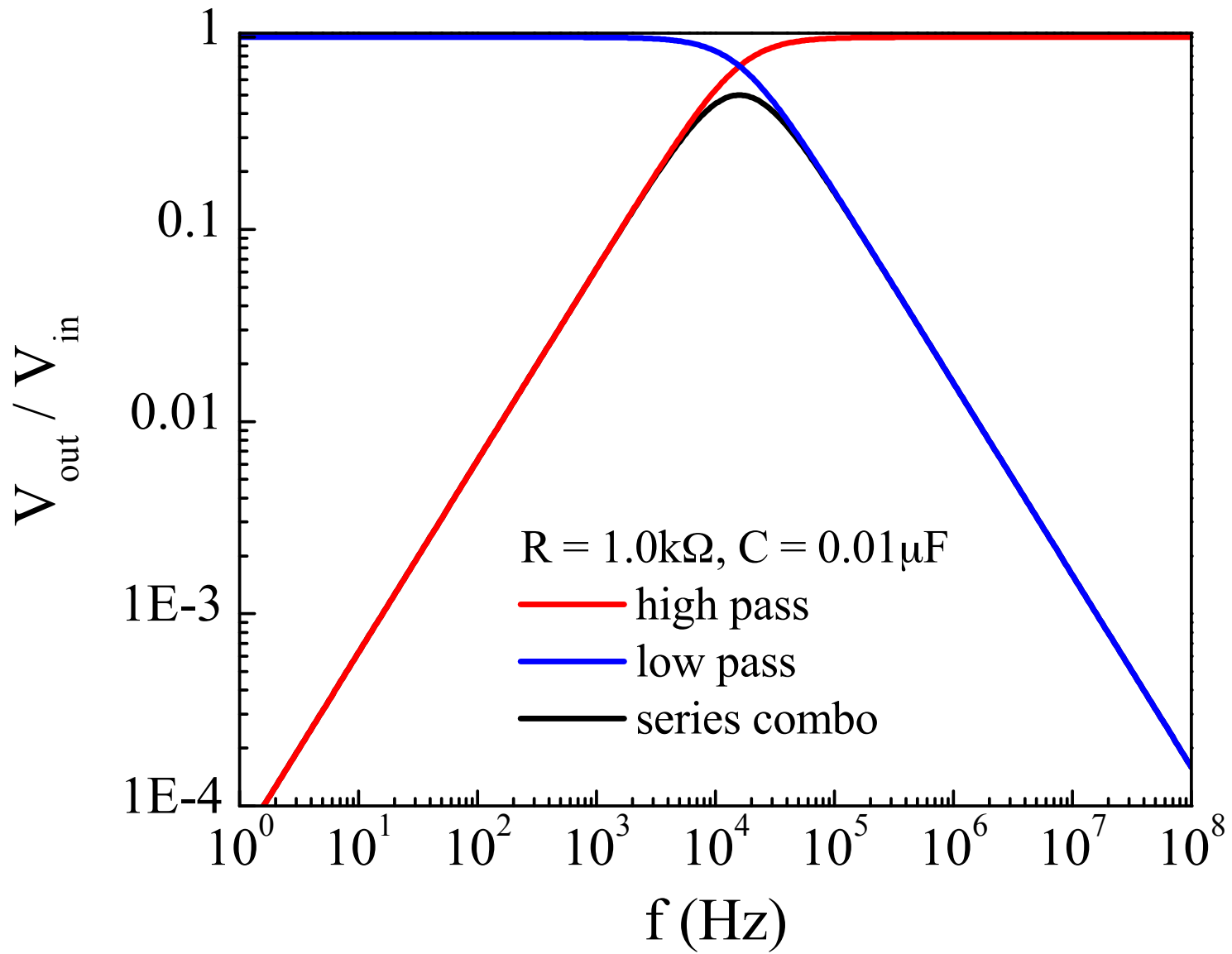


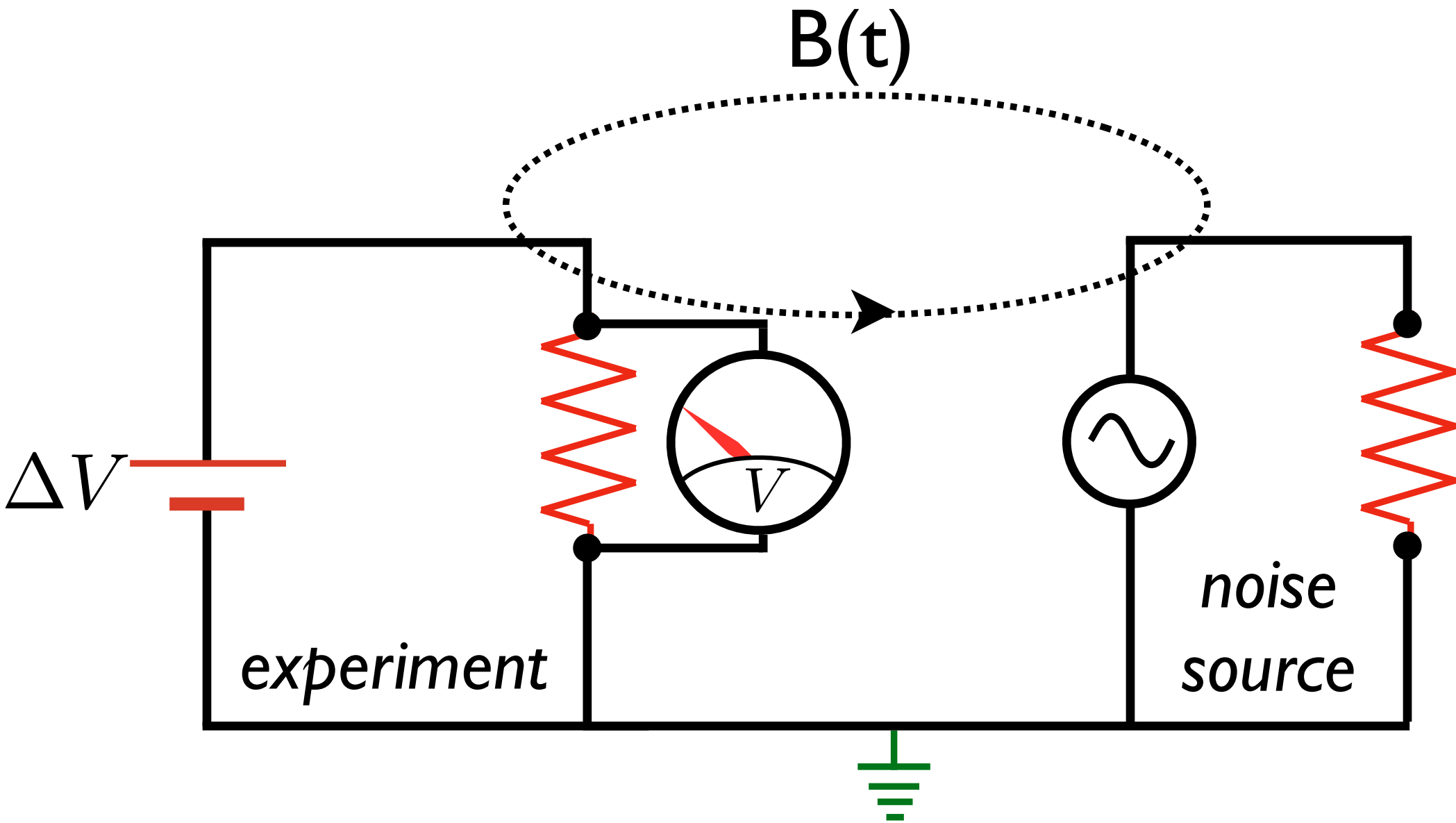
parallel

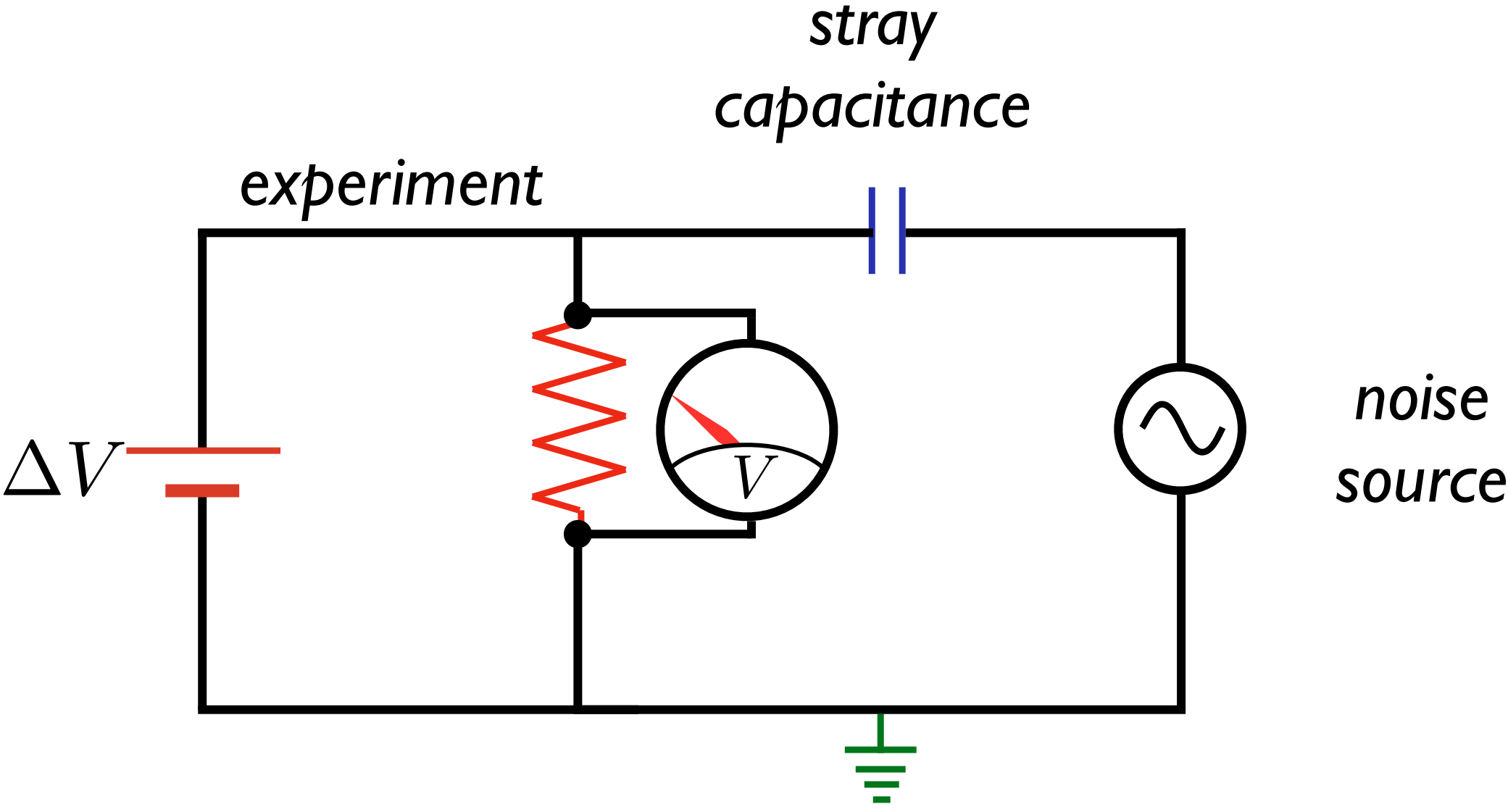


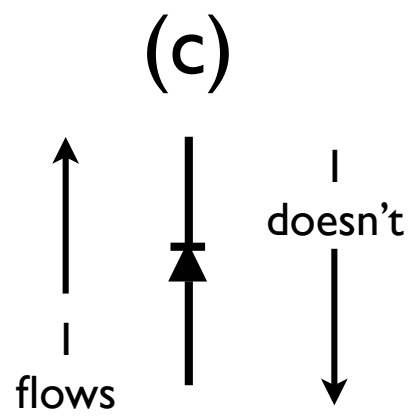
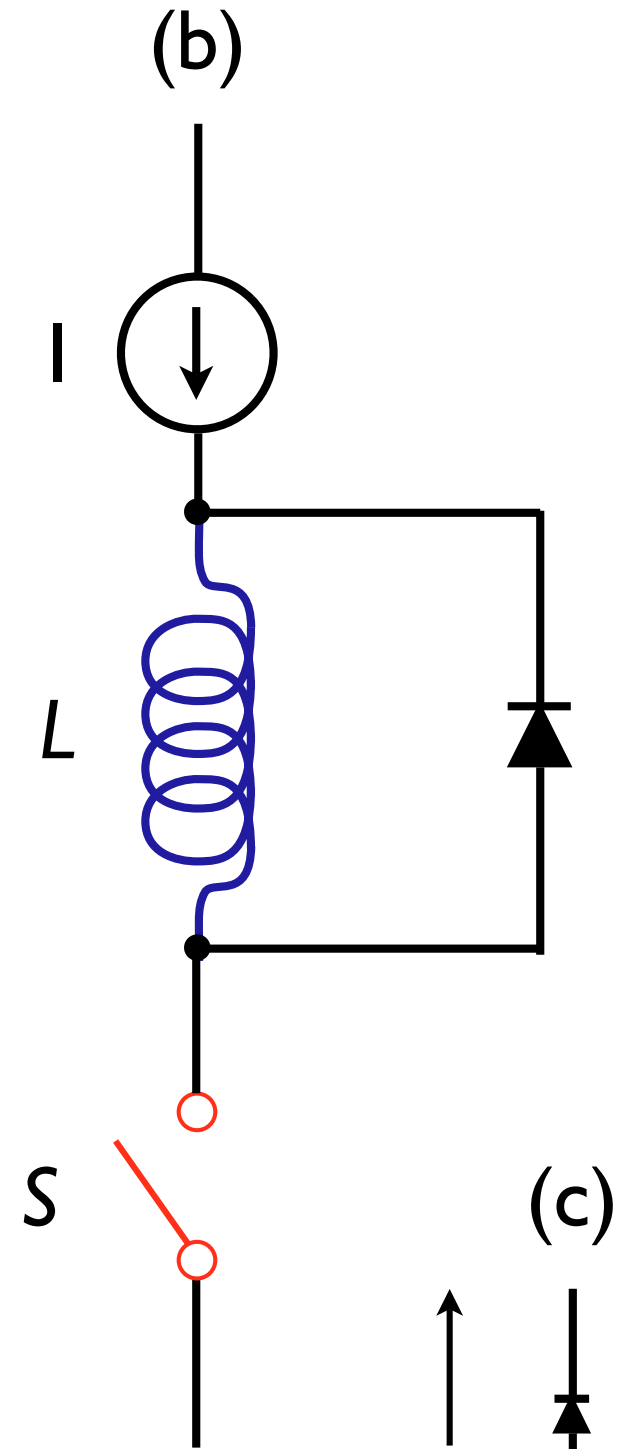
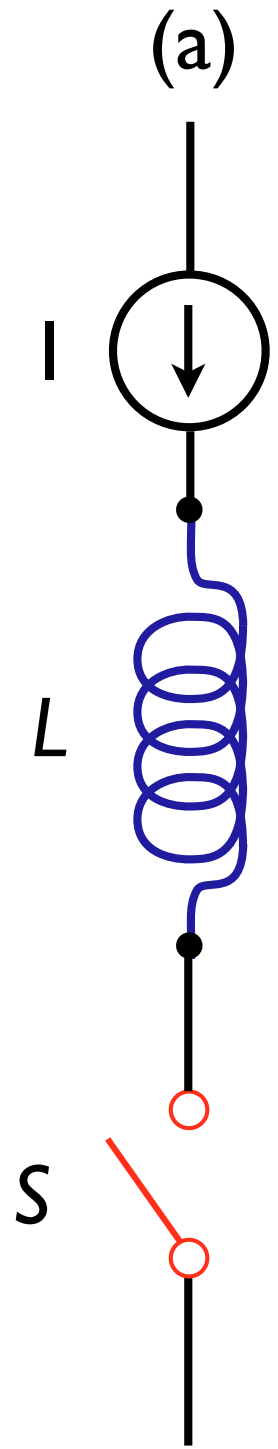


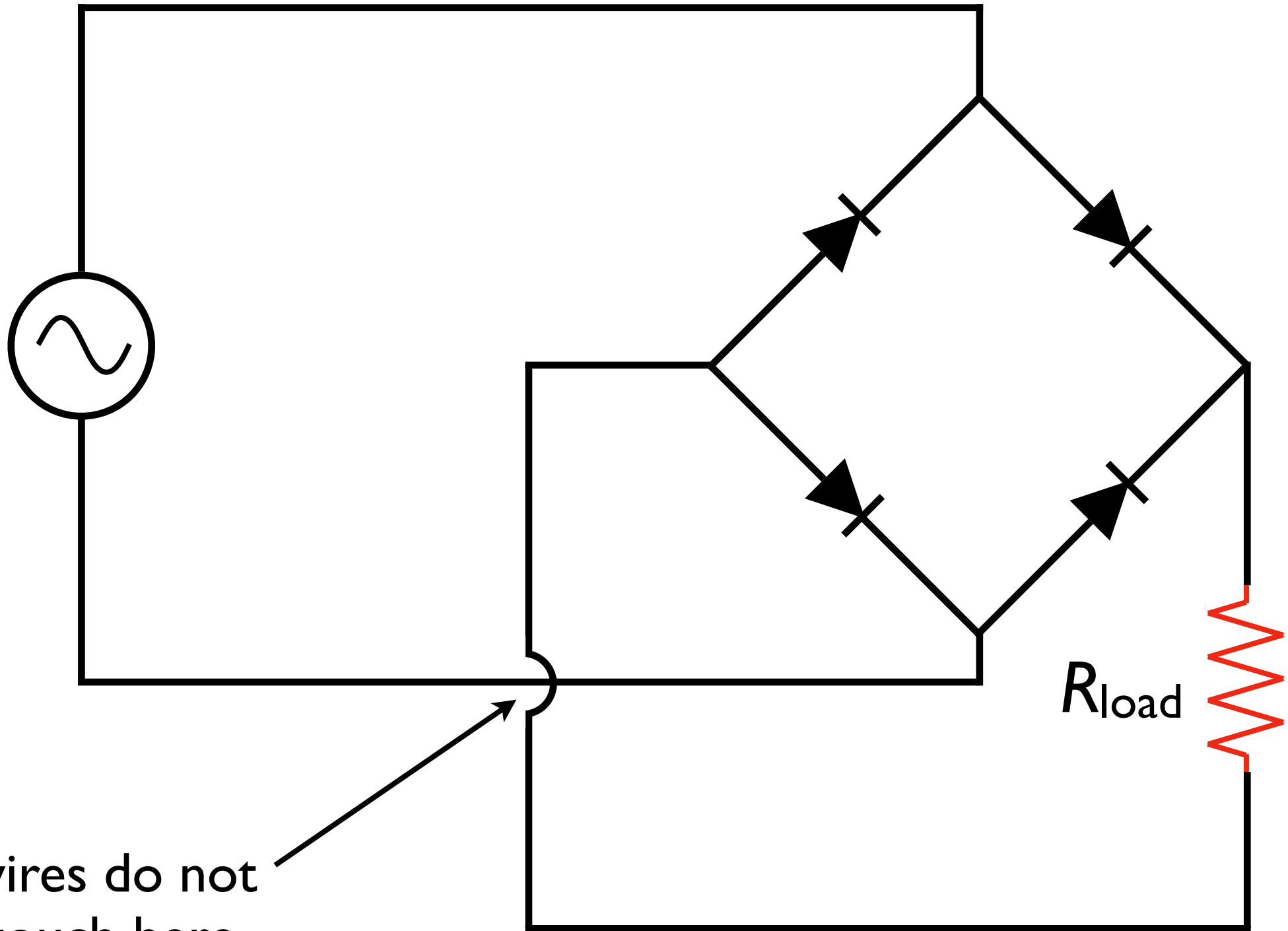




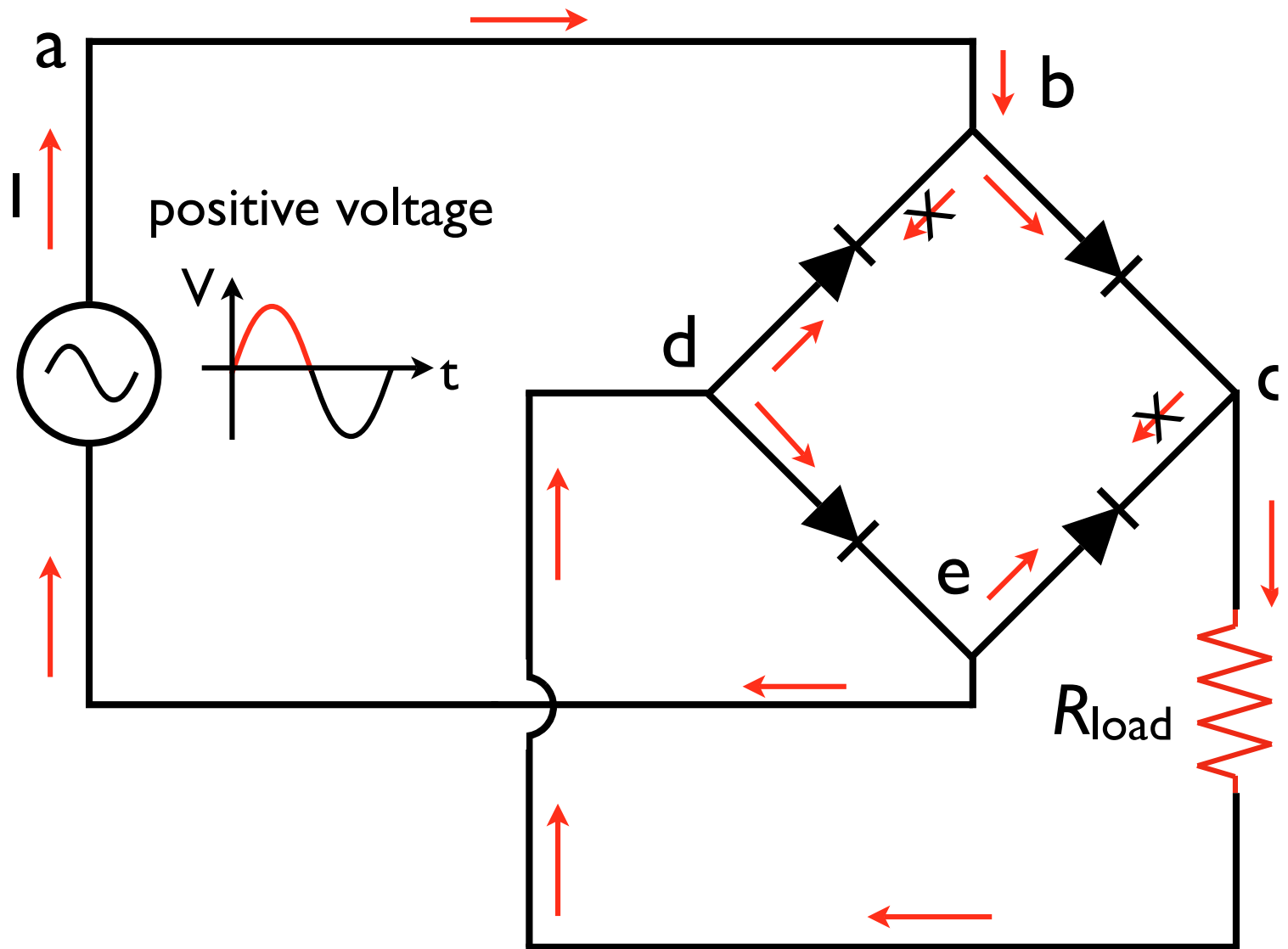


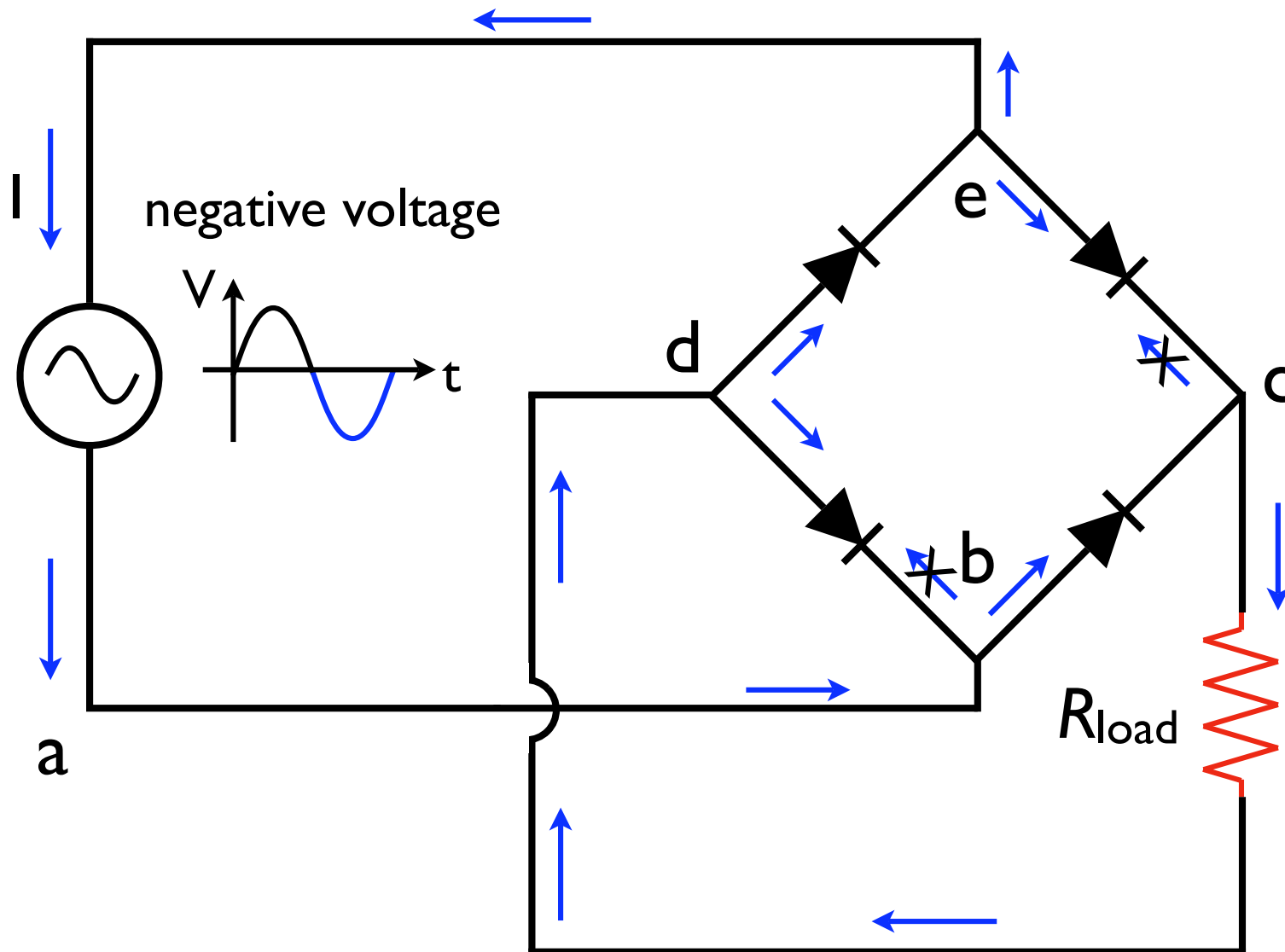


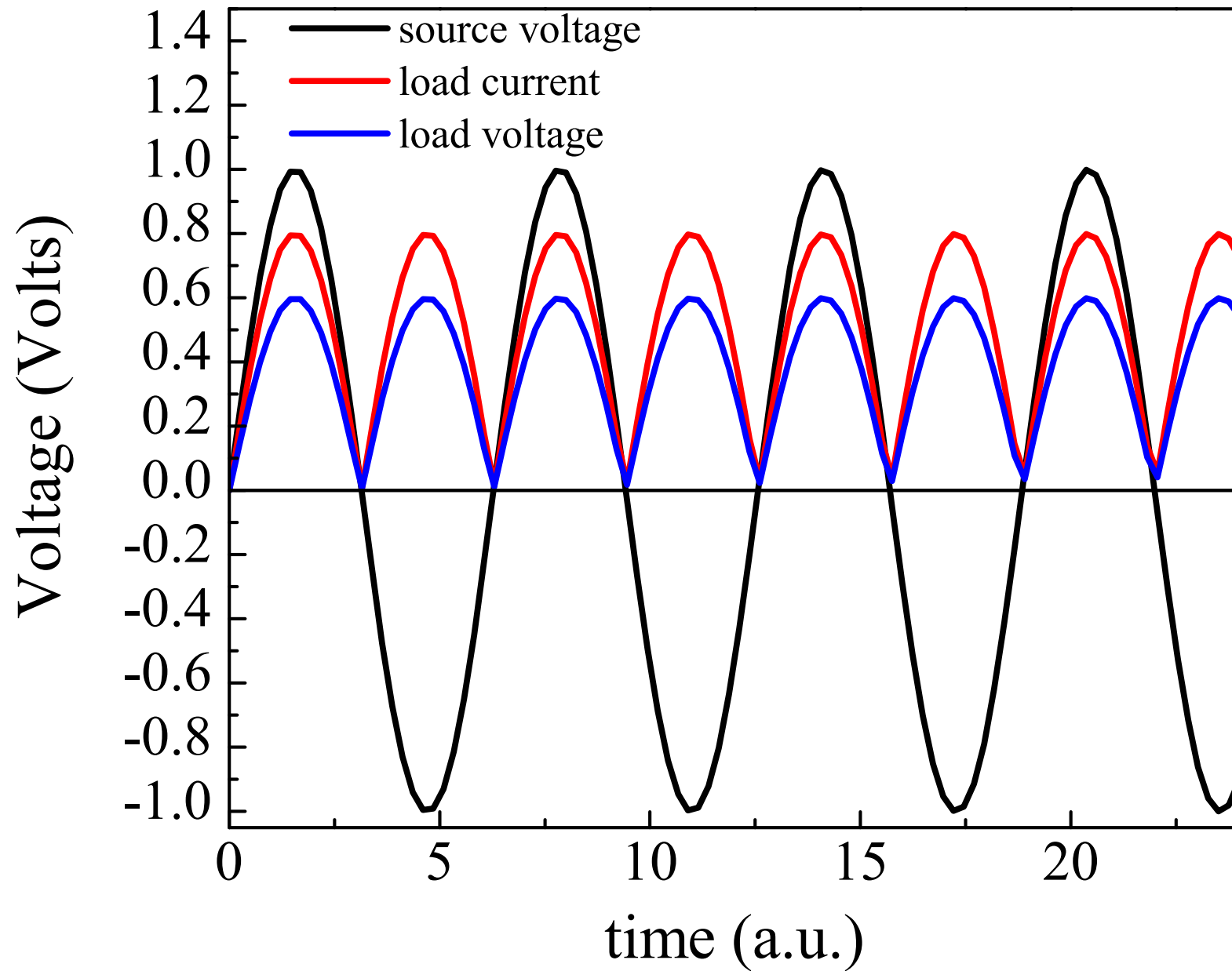


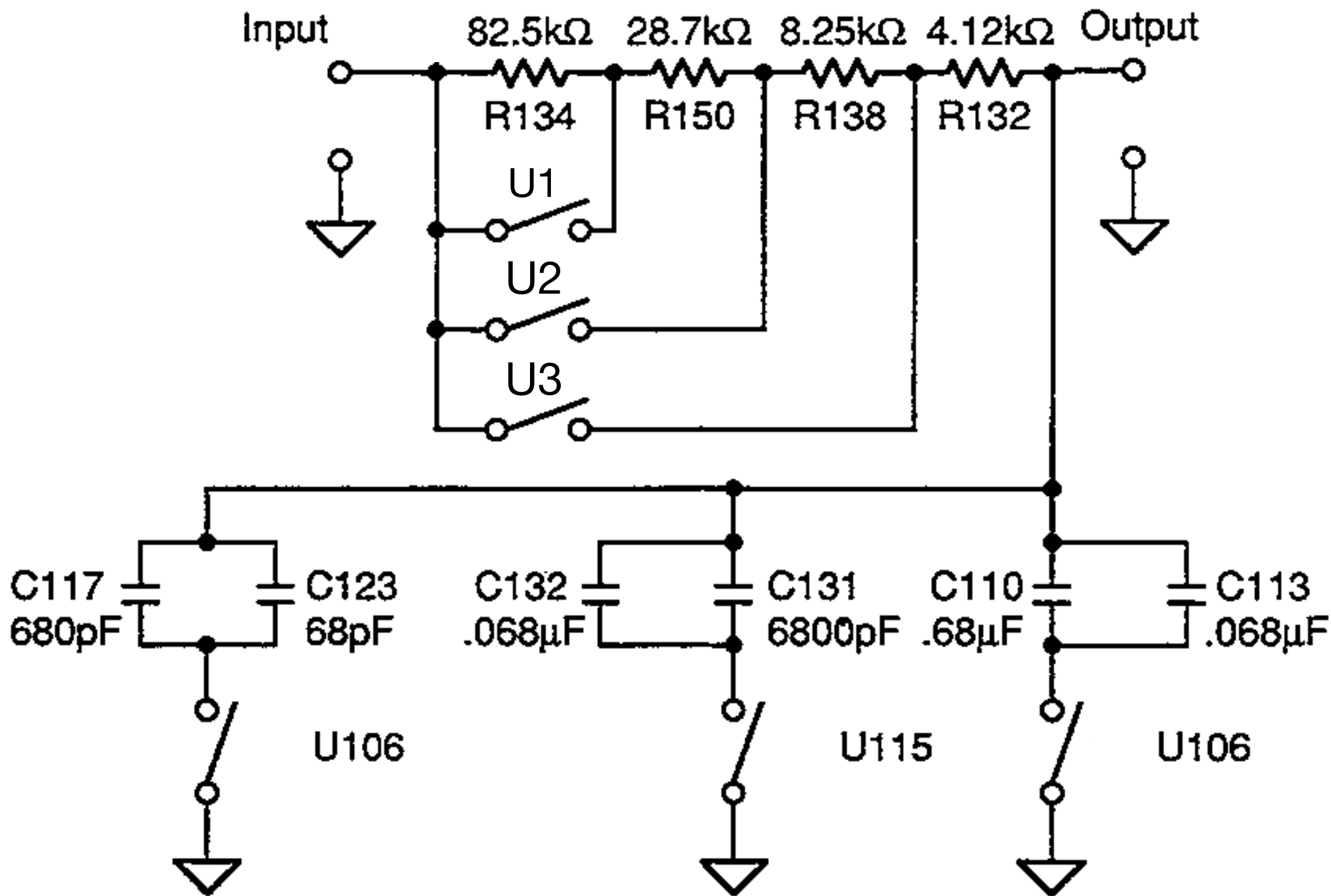


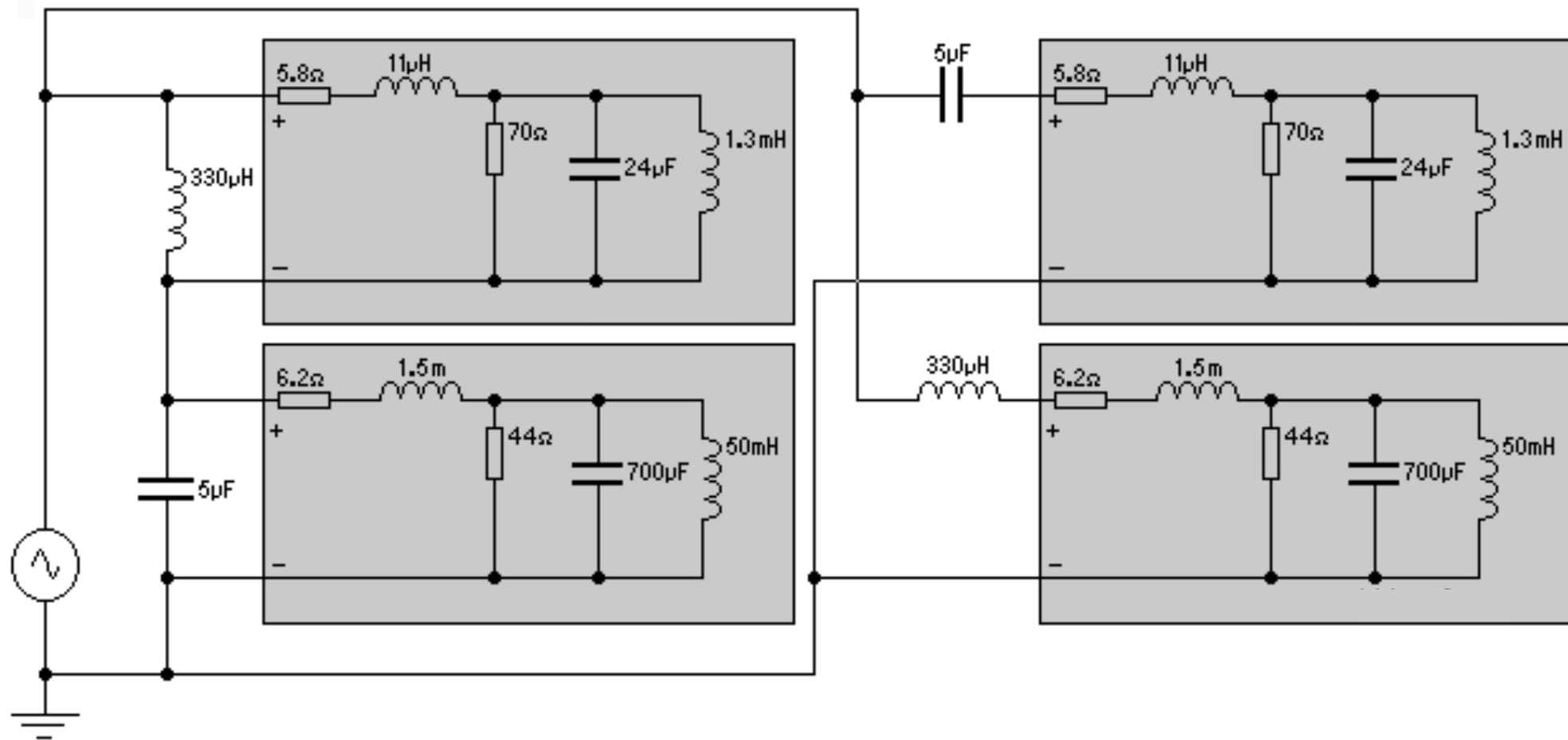
wires do not
touch here









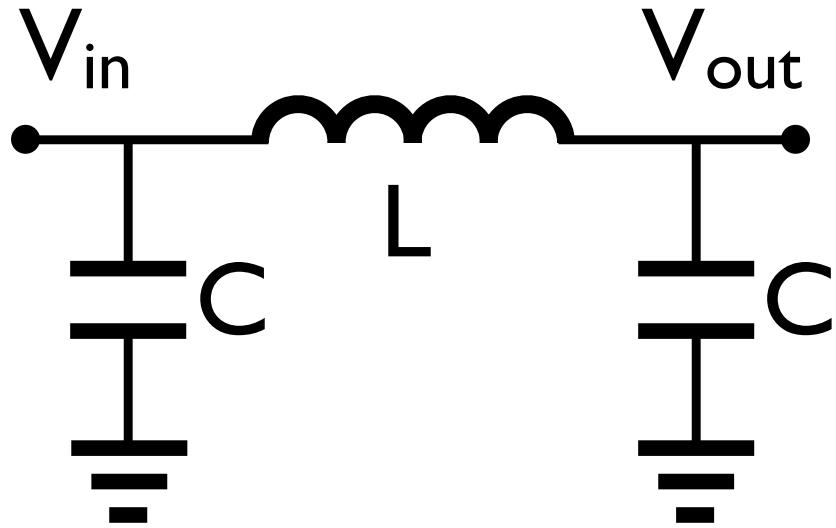
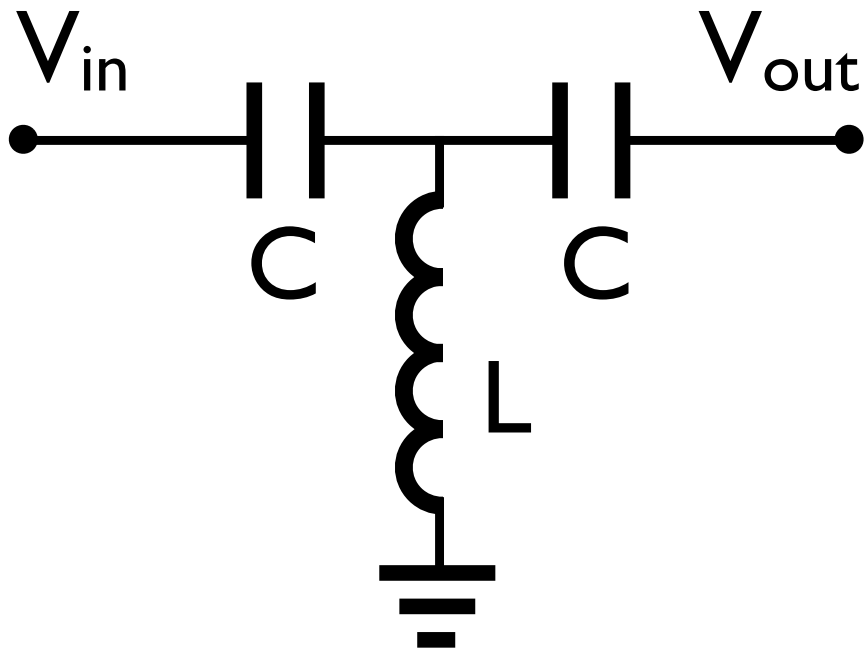


Generator Series

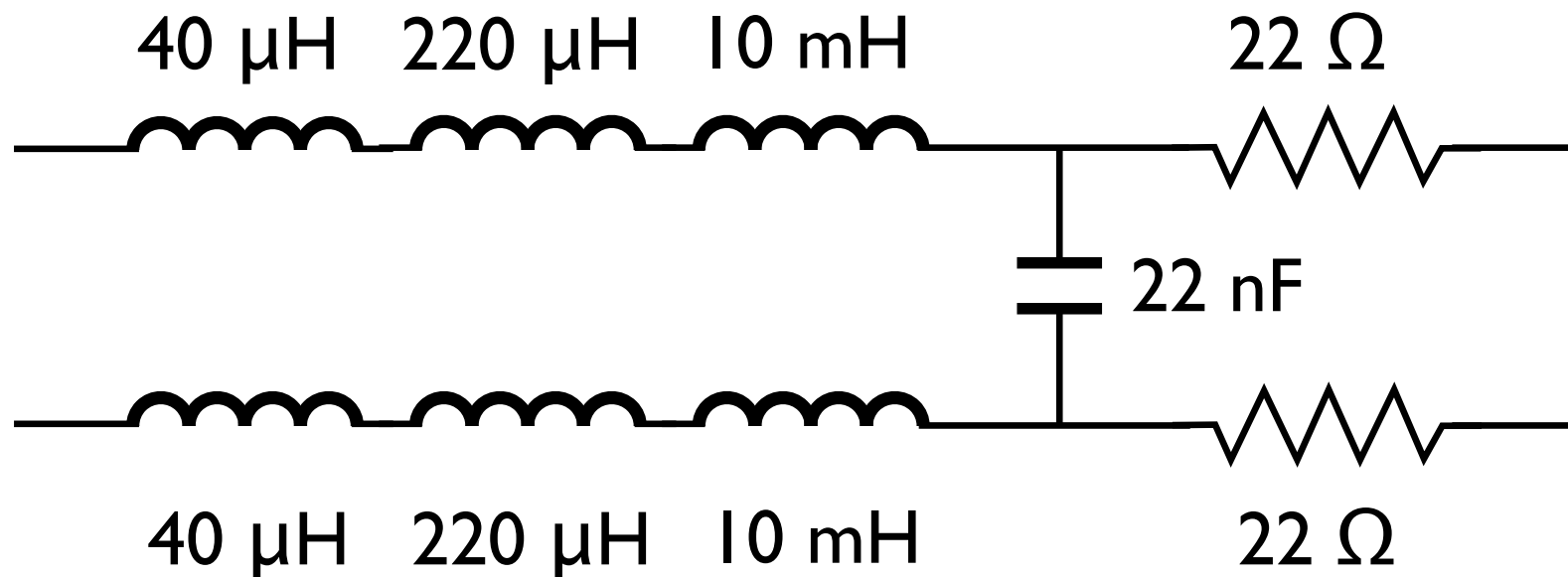
Drivers

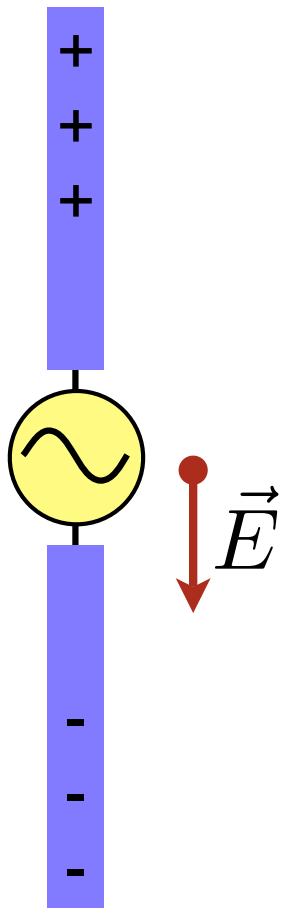
Parallel

Drivers



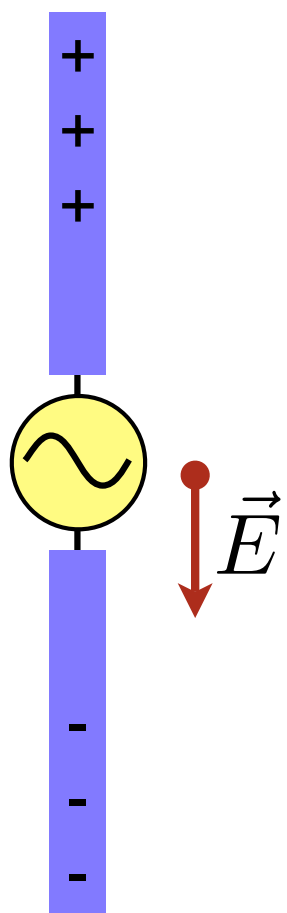
□ 4. Copper telephone wires were originally designed to carry speech only, using a band of frequencies from 300 Hz to 3400 Hz through a system called the PSTN (Public Switched Telephone Network). The ADSL (Asymmetric Digital Subscriber Line) uses frequencies very much higher than this speech band to carry fast data traffic using frequencies between 25 kHz and 1.1 MHz. To ensure that the higher-frequency transmissions do not interfere with normal phone electronics, filters like that shown below must be installed on all lines to separate data and voice signals.





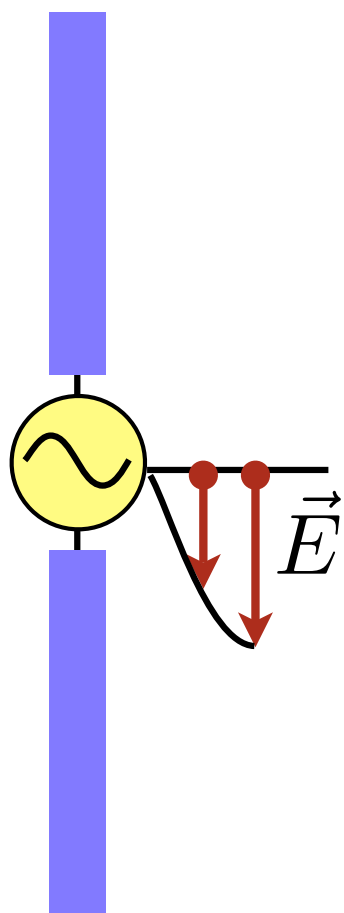
$t = 0$

(a)



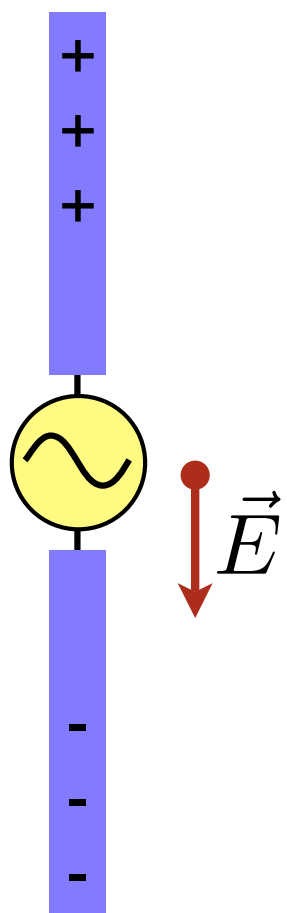
$t = 0$

(a)



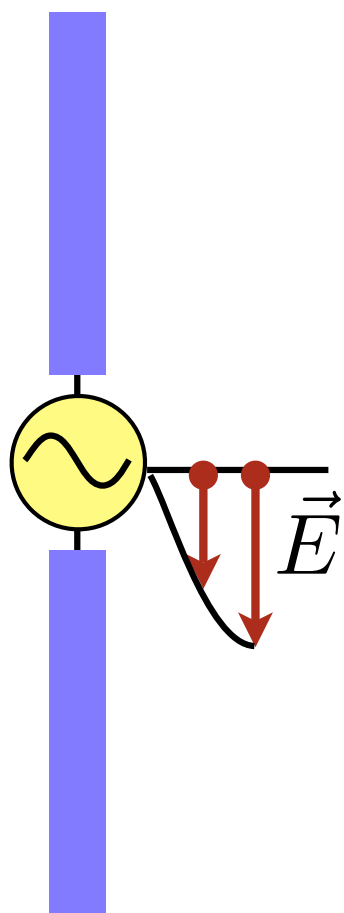
$t = \frac{T}{4}$

(b)



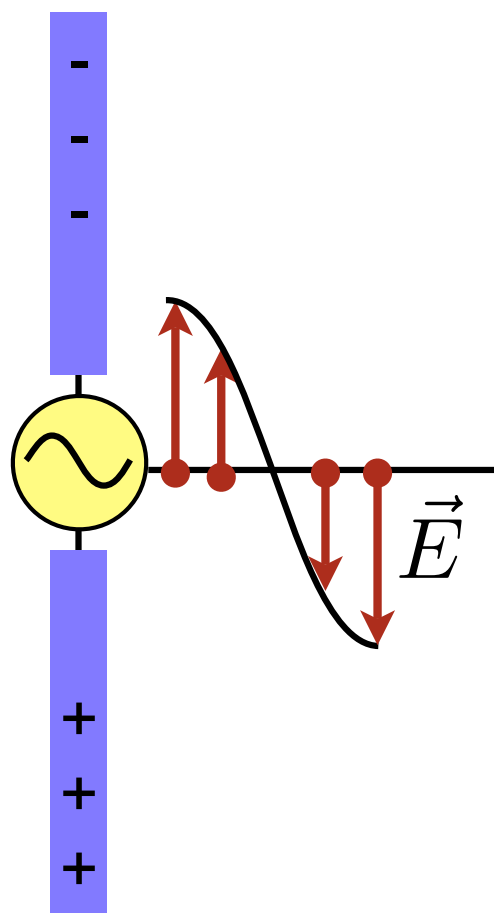
$t = 0$

(a)



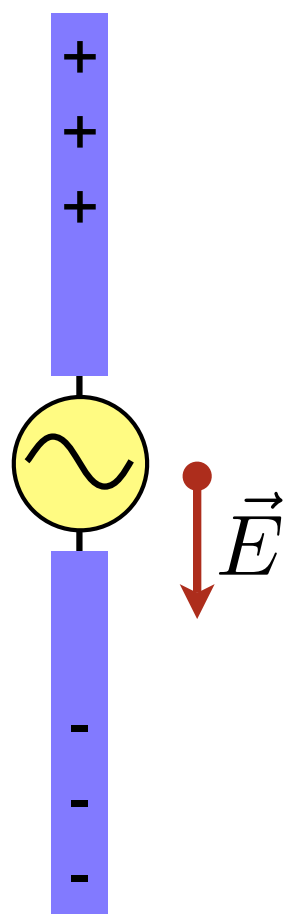
$t = \frac{T}{4}$

(b)



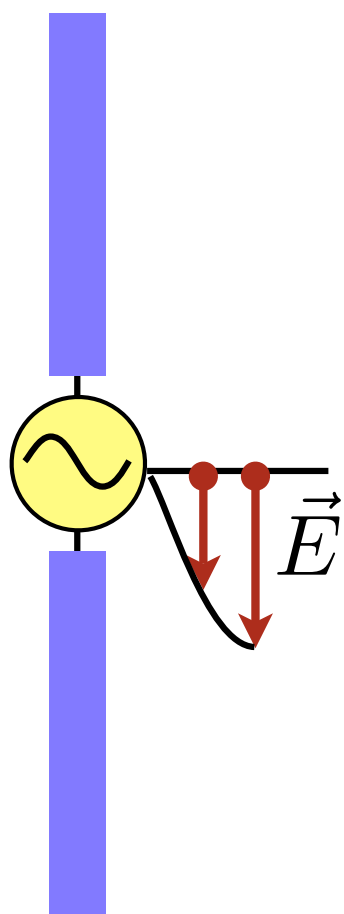
$t = \frac{T}{2}$

(c)



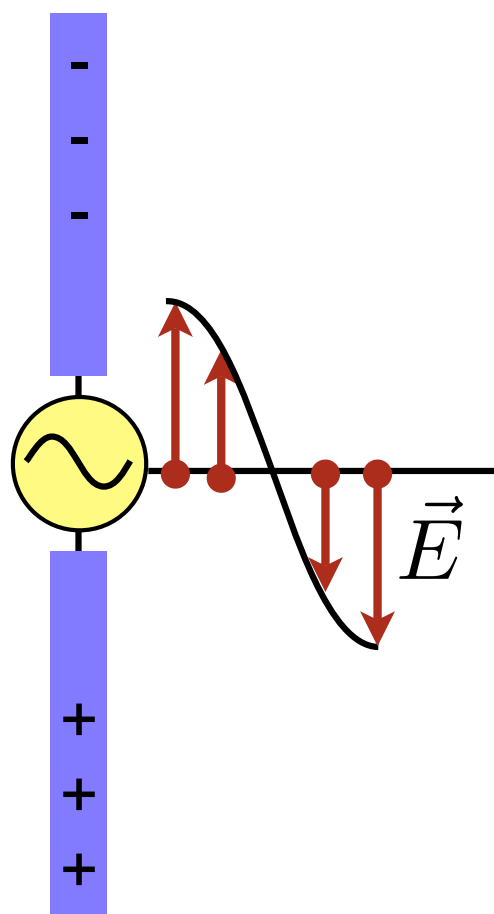
$t = 0$

(a)



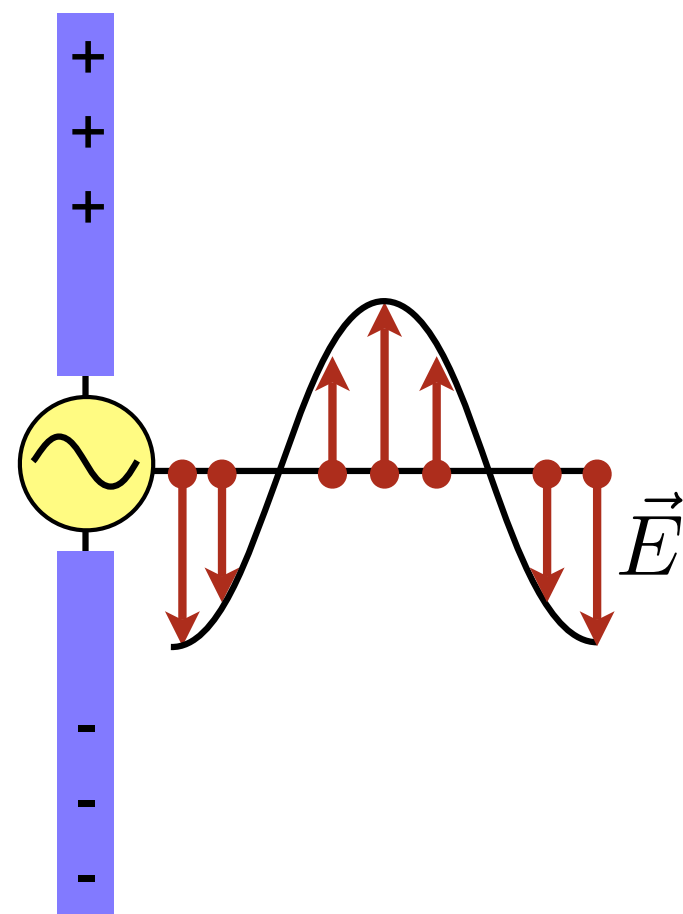
$t = \frac{T}{4}$

(b)



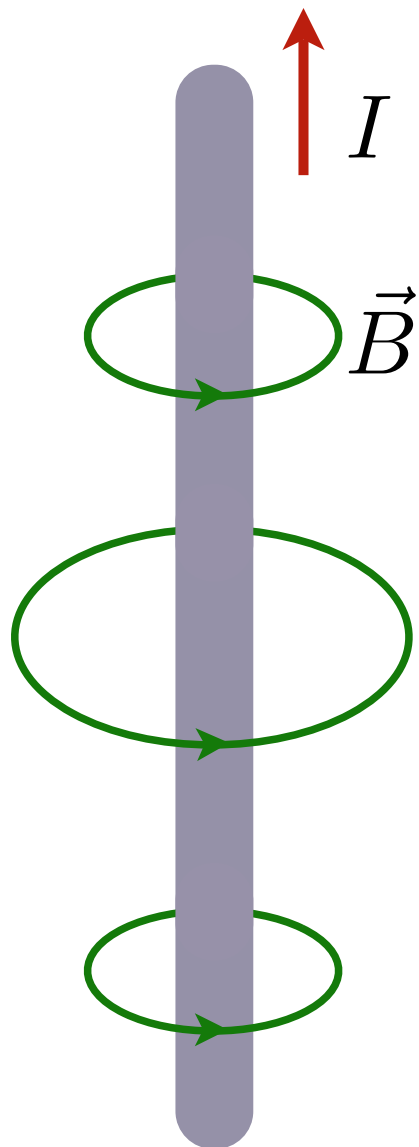
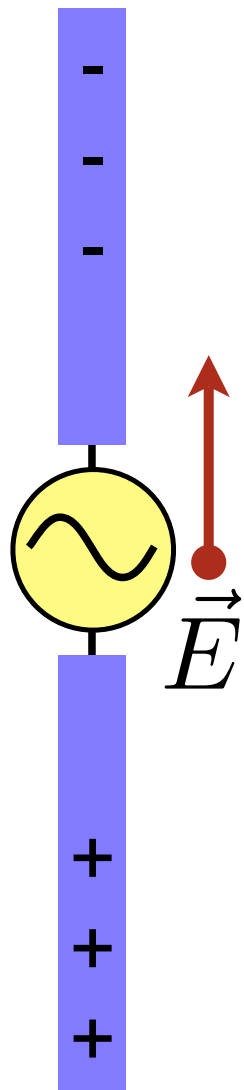
$t = \frac{T}{2}$

(c)



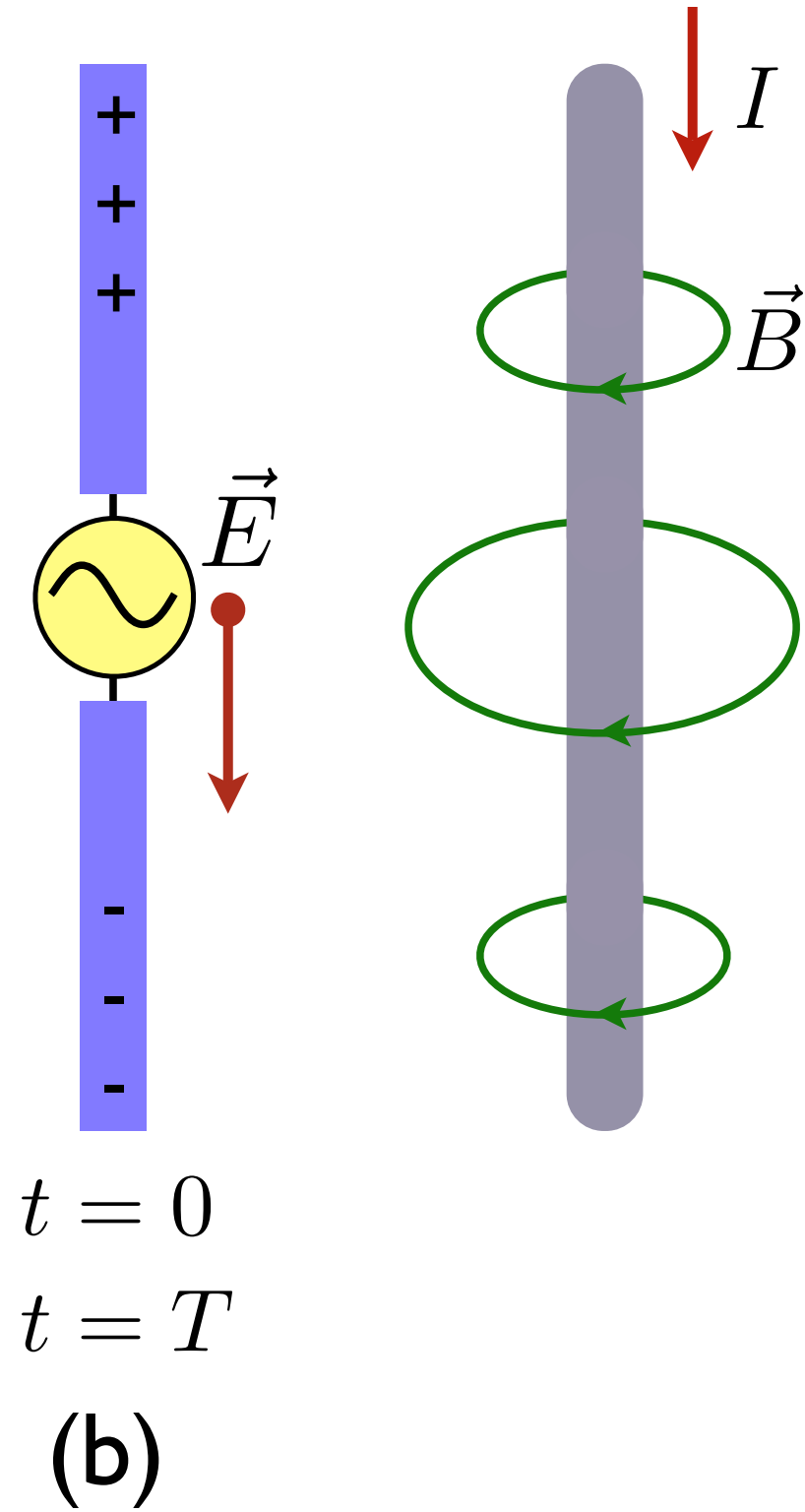
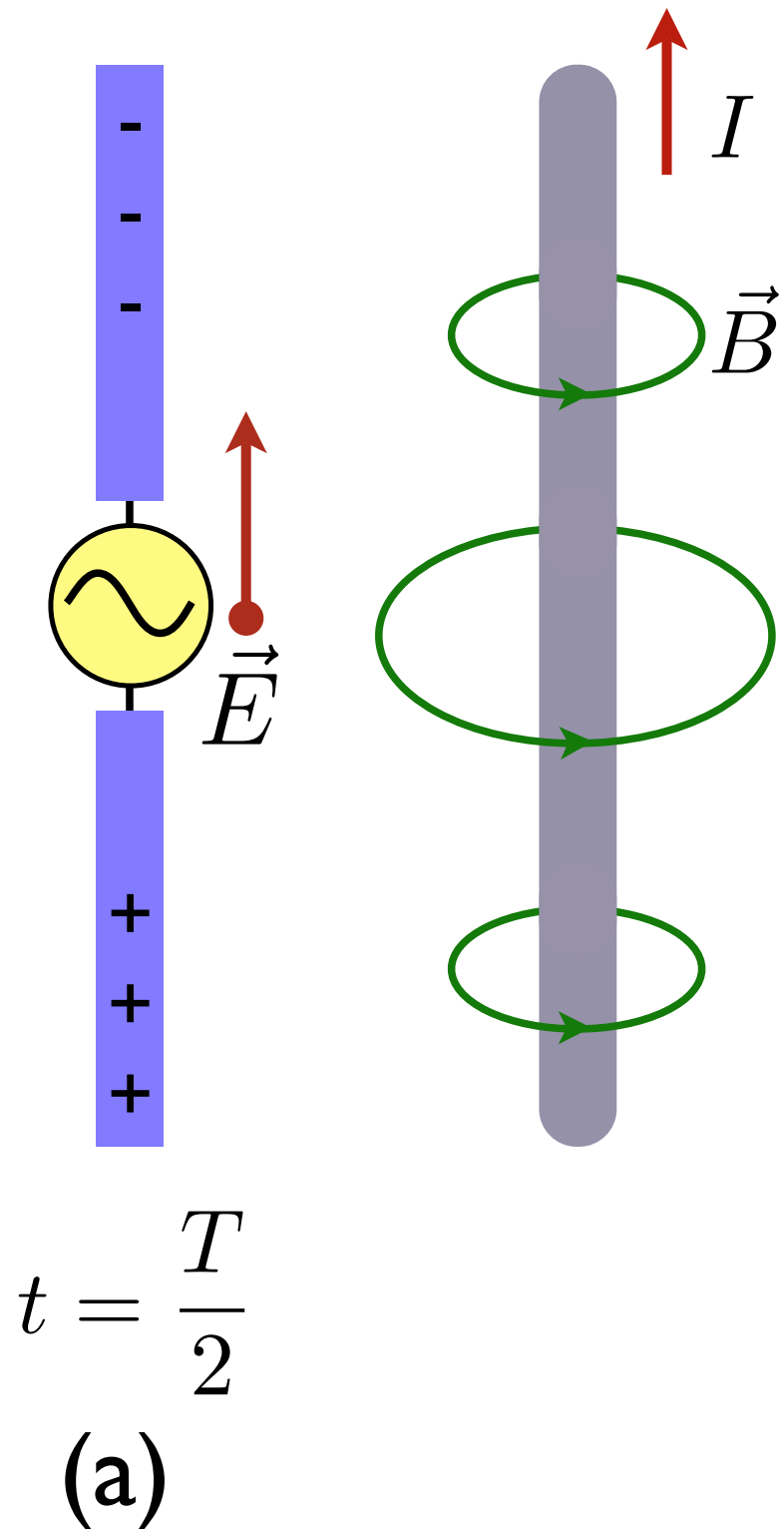
$t = T$

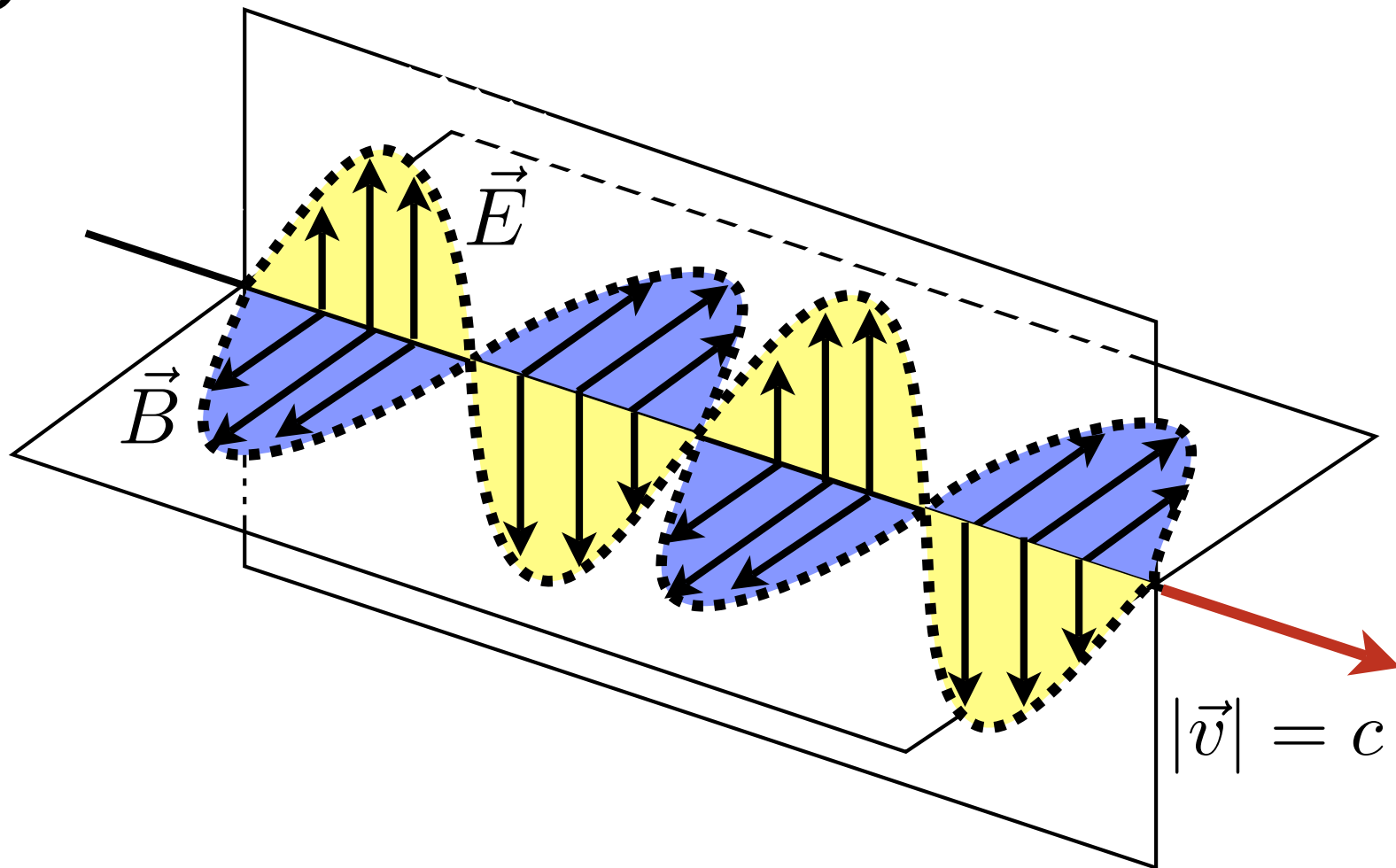
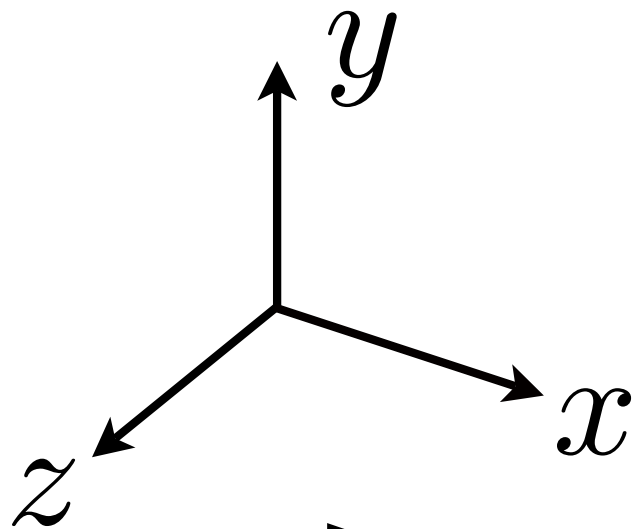
(d)

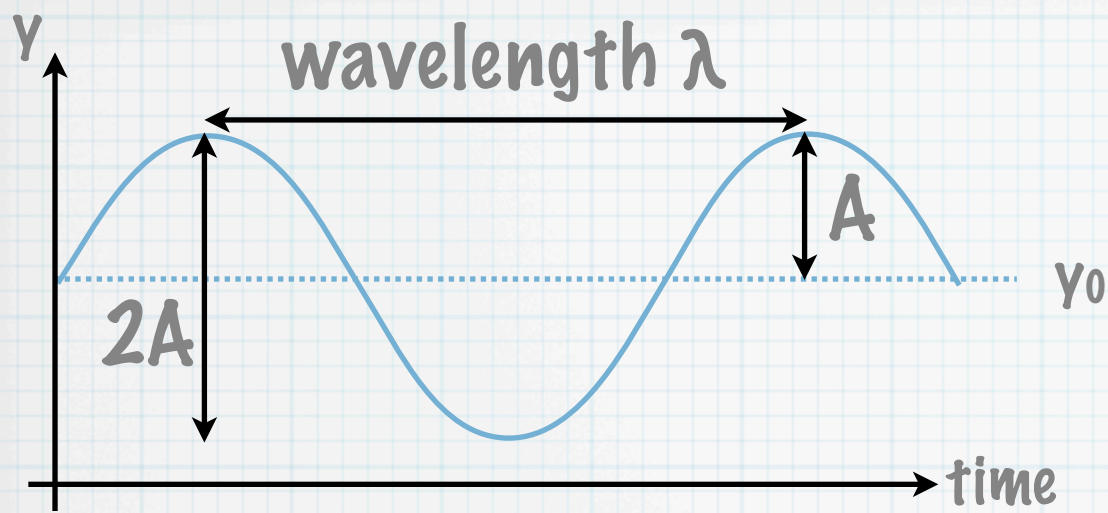


$$t = \frac{T}{2}$$

(a)







λ characterizes
SPATIAL variation

f characterizes
TIME variation

T = Period = how long per cycle

$$T = 1/f \quad \text{or} \quad f = 1/T$$

frequency - wavelength - velocity:

$\lambda f = v$ = velocity of wave propagation

or $vT = \lambda$ travel one wavelength per period

simplest wave:

$$f(x, t) = A \sin \left(2\pi f t - \frac{2\pi}{\lambda} x \right)$$

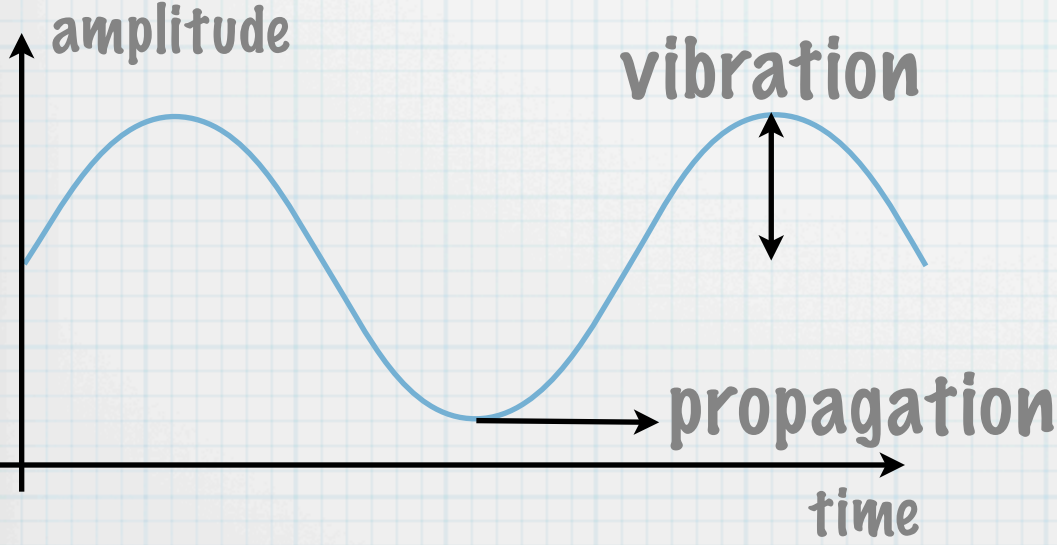
Characteristics of waves

they have Crests & Troughs

- intensity varies periodically. "vibration"

Longitudinal

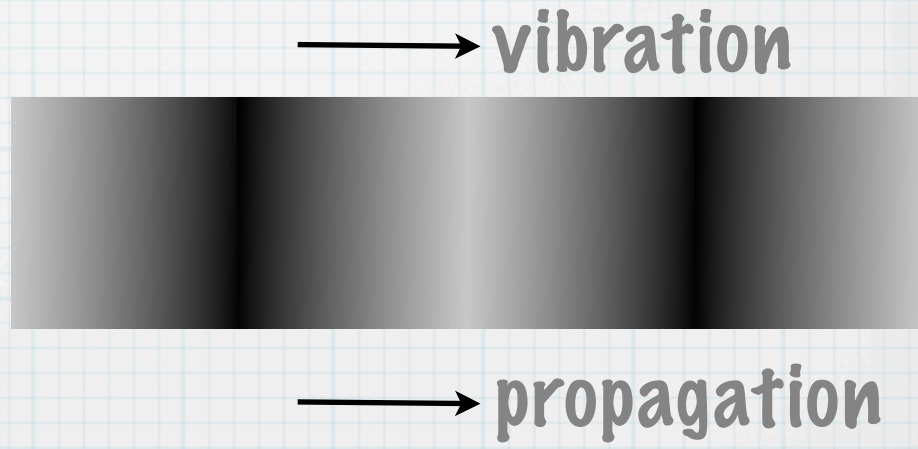
vibrations are **PERPENDICULAR** to propagation



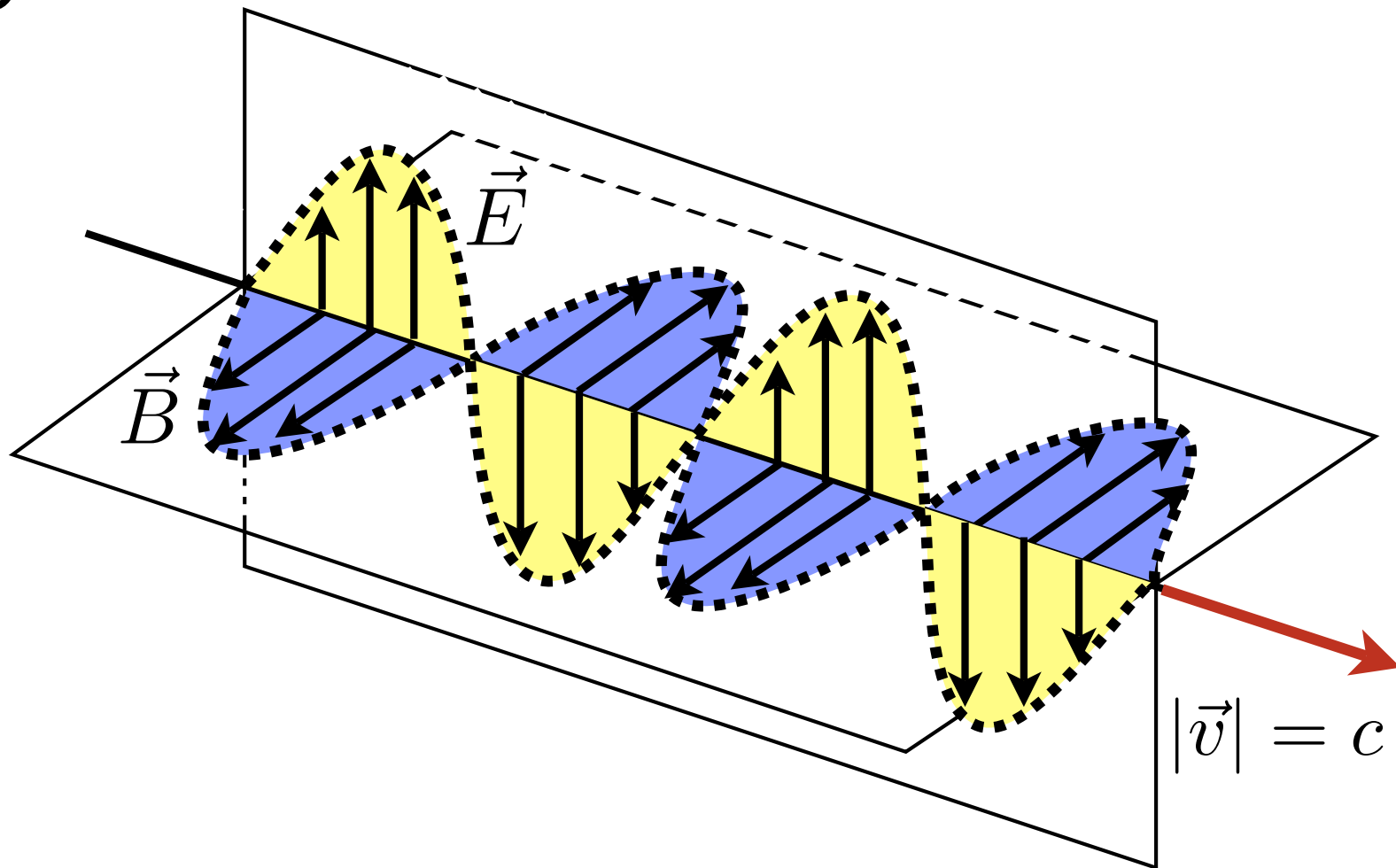
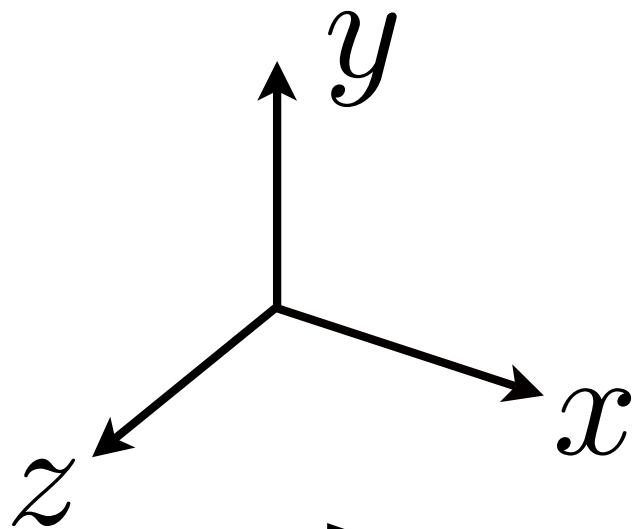
string, EM waves

Transverse

vibrations are **PARALLEL** to propagation



sound



Electromagnetic Spectrum

