

# Changing electromagnetics fields

## Electromagnetics

Static electric fields are independent from static magnetic fields. In dynamic electromagnetic fields changing electric field induces changing magnetic field and so on.

### Induced EMF

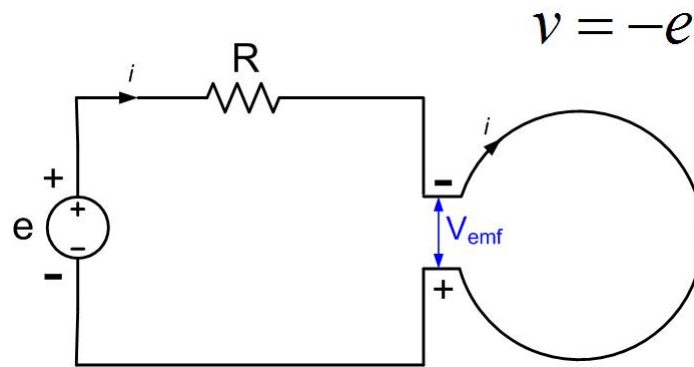


Figure 1: Induced voltage due to a loop of wire with AC current. Voltage induced is due to inductance of the loop of wire.

### Motional EMF

#### Inductance in circuit theory

##### Example 1. Voltage droop in electronic circuits

##### Example 2. Ground bounce in electronic circuits

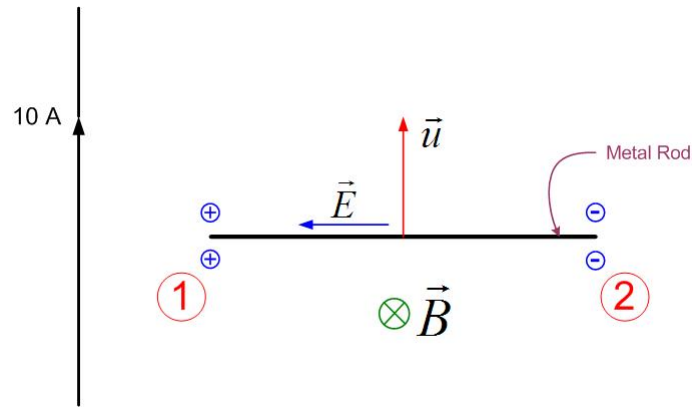


Figure 2: Example of induced motional electromotive force.

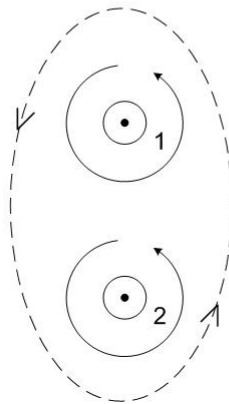
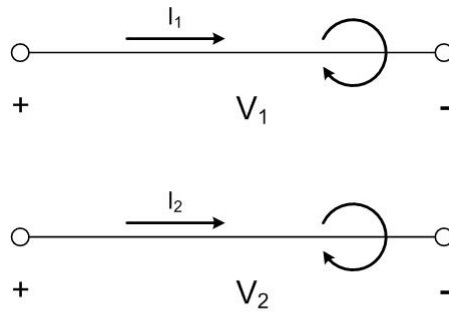


Figure 3: Mutual Inductance: Increasing the magnetic field and therefore current in one wire due to another wire in vicinity.

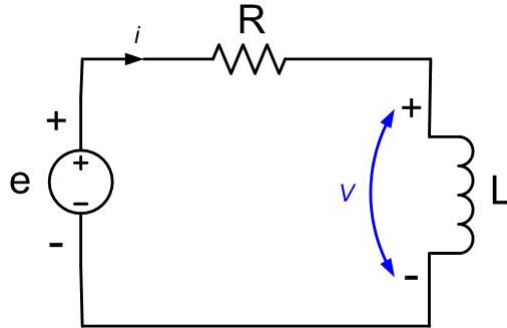


Figure 4: Simple electronic circuit with an inductance and resistance.

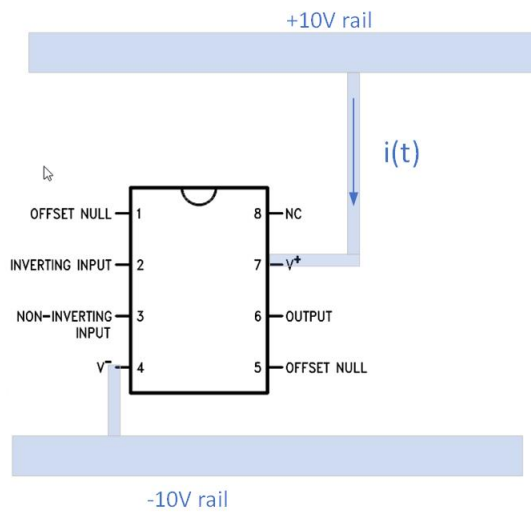


Figure 5: Voltage droop in electronic circuits.

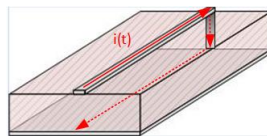


Figure 6: Ground bounce in electronic circuits.