Physics-L2 Electromagnetism

Approximative program

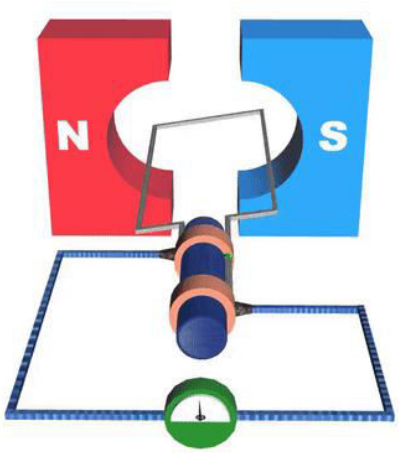
Chap 1: Electrostatics
Chap 2: Magnetostatics
Chap 3: Time-dependent regime-Induction phenomena

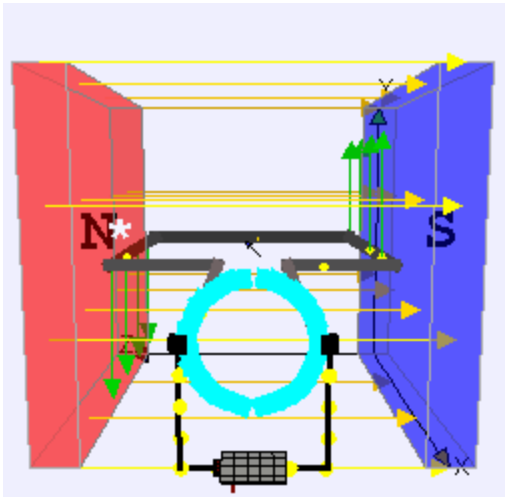
Integrated course: Electro-mechanical conversion

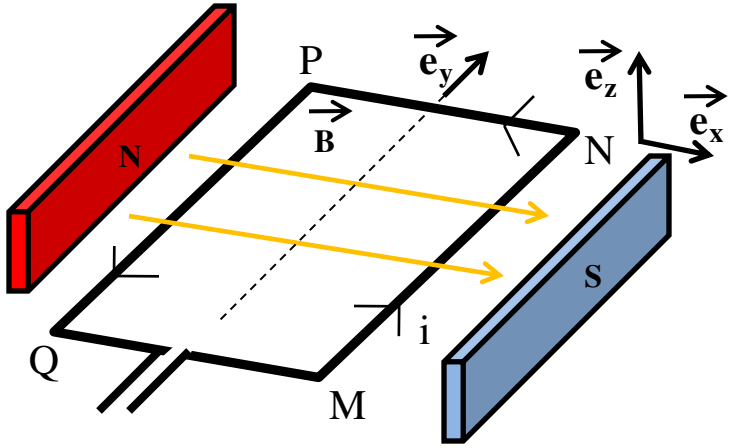
1. **Principles of DC Motor**
2. **Principle of AC Synchrone Motor**
3. **Principle of a Loud-Speaker**

Chap 4: Maxwell equations
Chap 5: Dielectric media and applications
Chap 6: Conducting media and applications
Chap 7: Magnetic media and applications

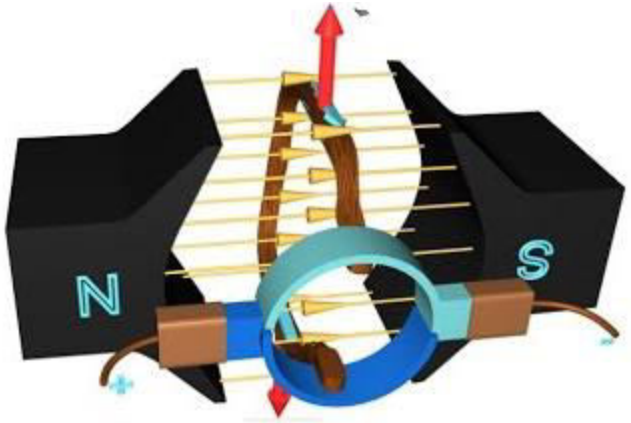
DC Motor: main principle: Laplace force

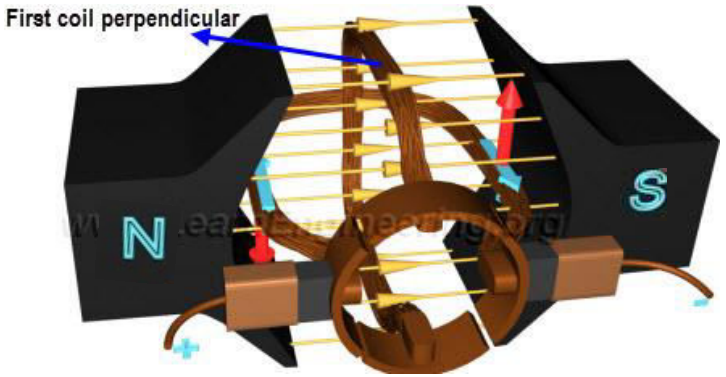


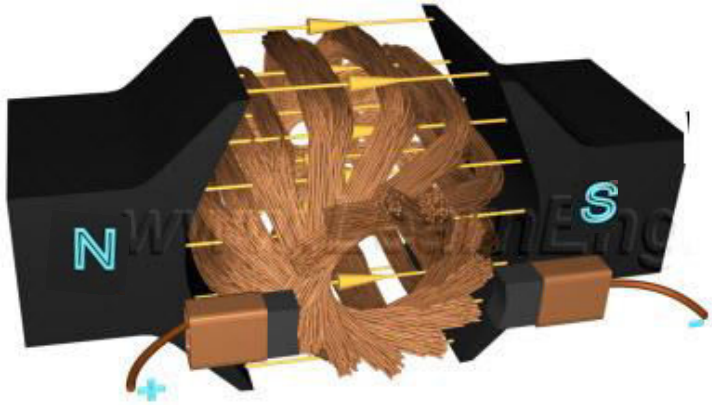


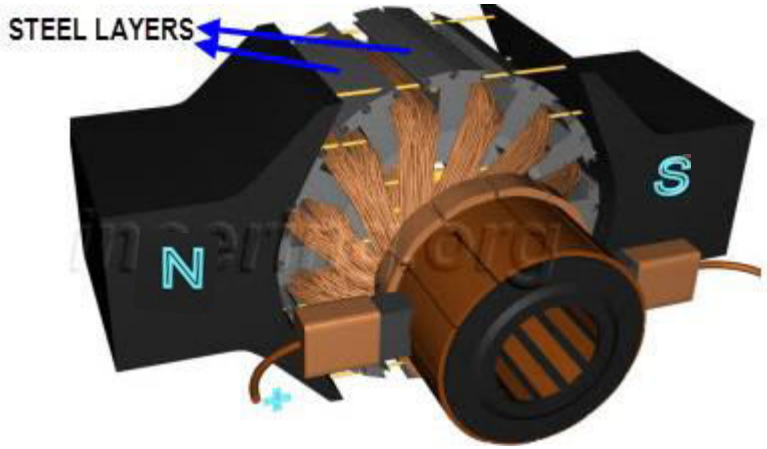


DC Motor: Made of many current loops

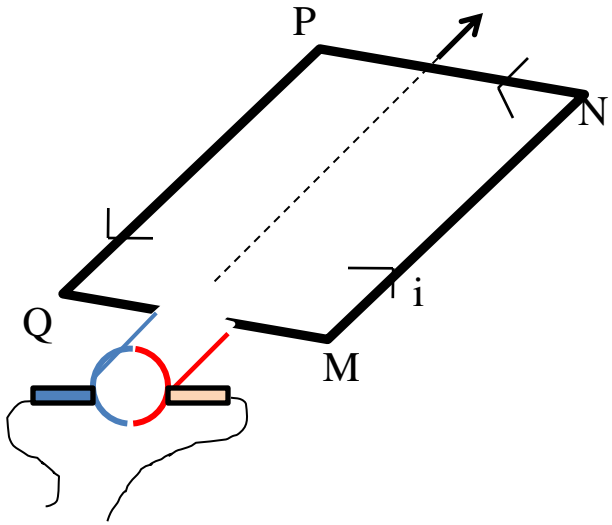


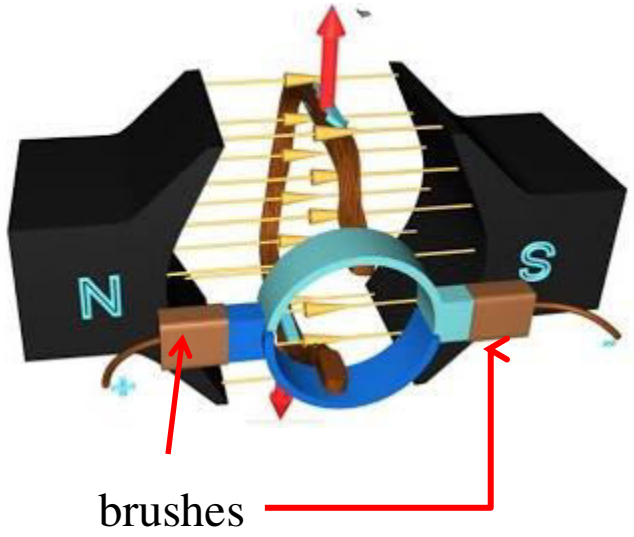






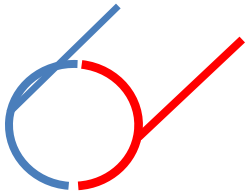
How to collect the current



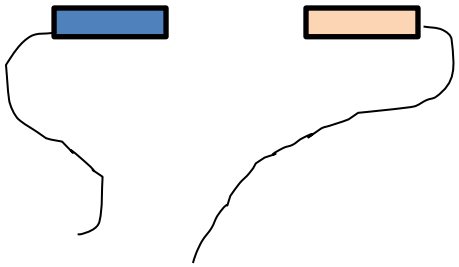


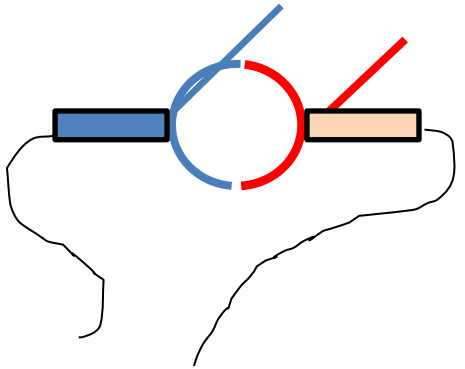
Keep electric contact during rotation

collectors (move)



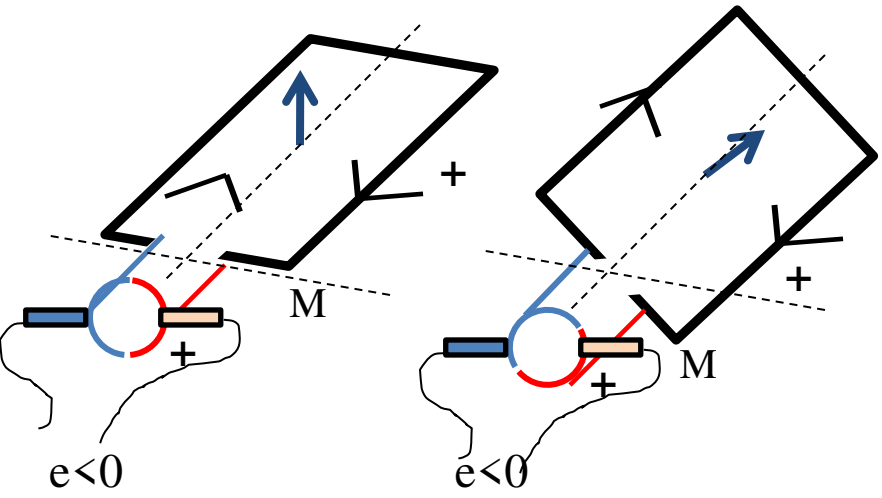
Brushes (fixed)

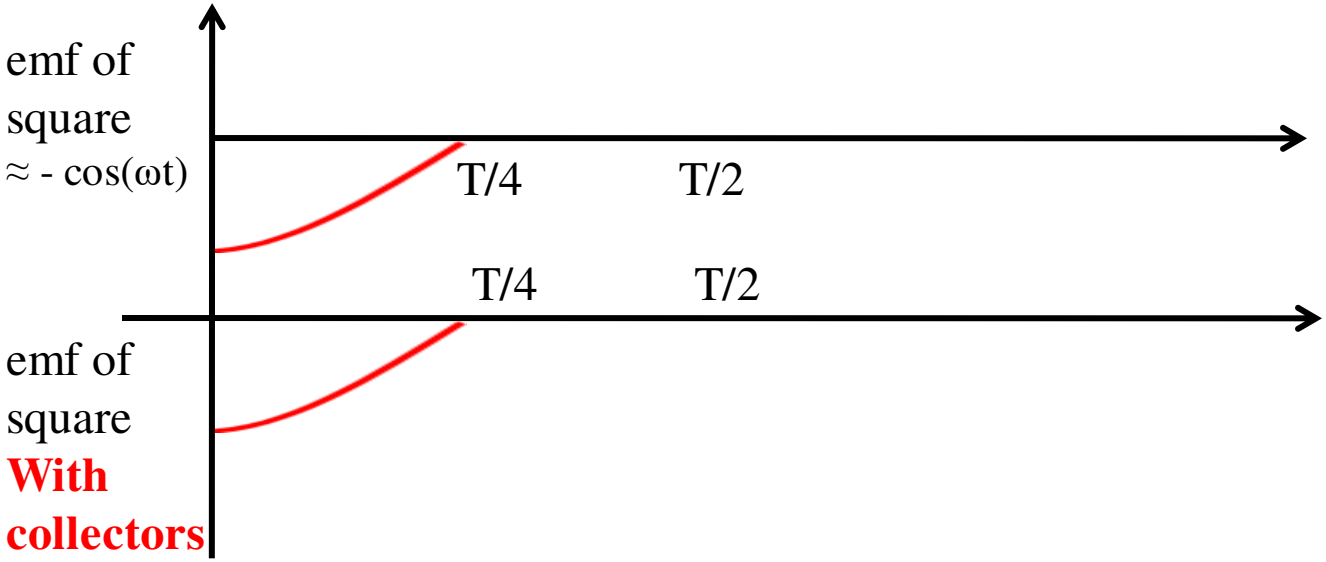




Electromotive force- with collector/brushes : FIRST HALF PERIOD

For t [0, T/4] $d\Phi>0$ so $e \approx -d\Phi<0$

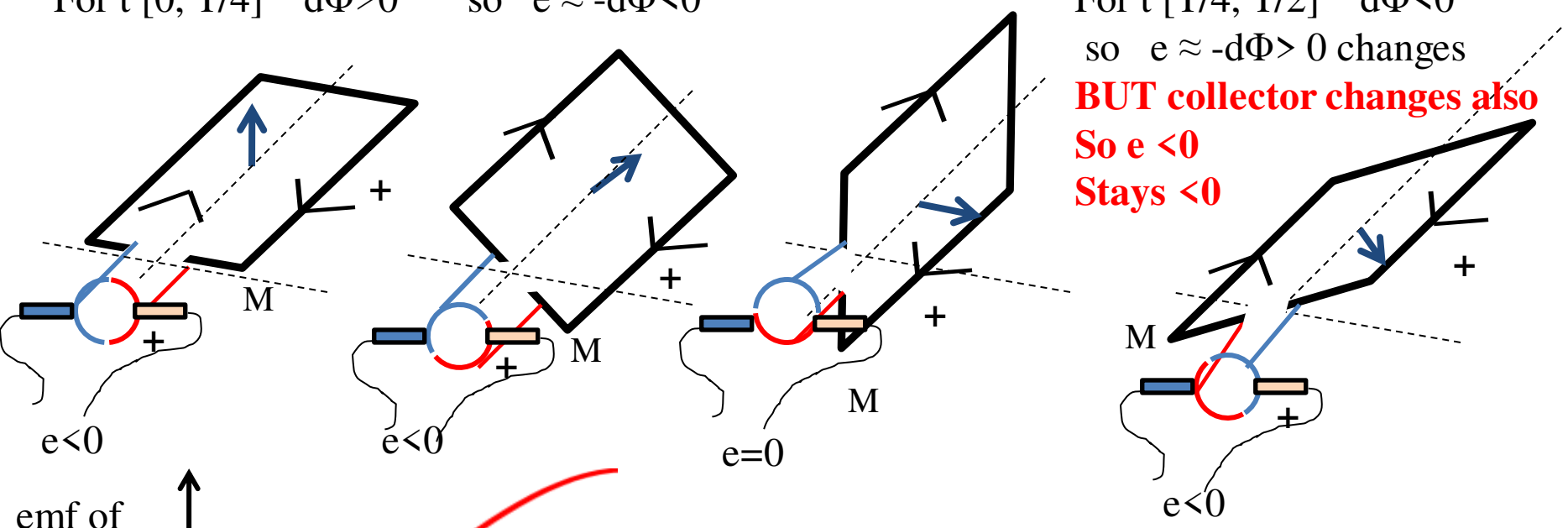


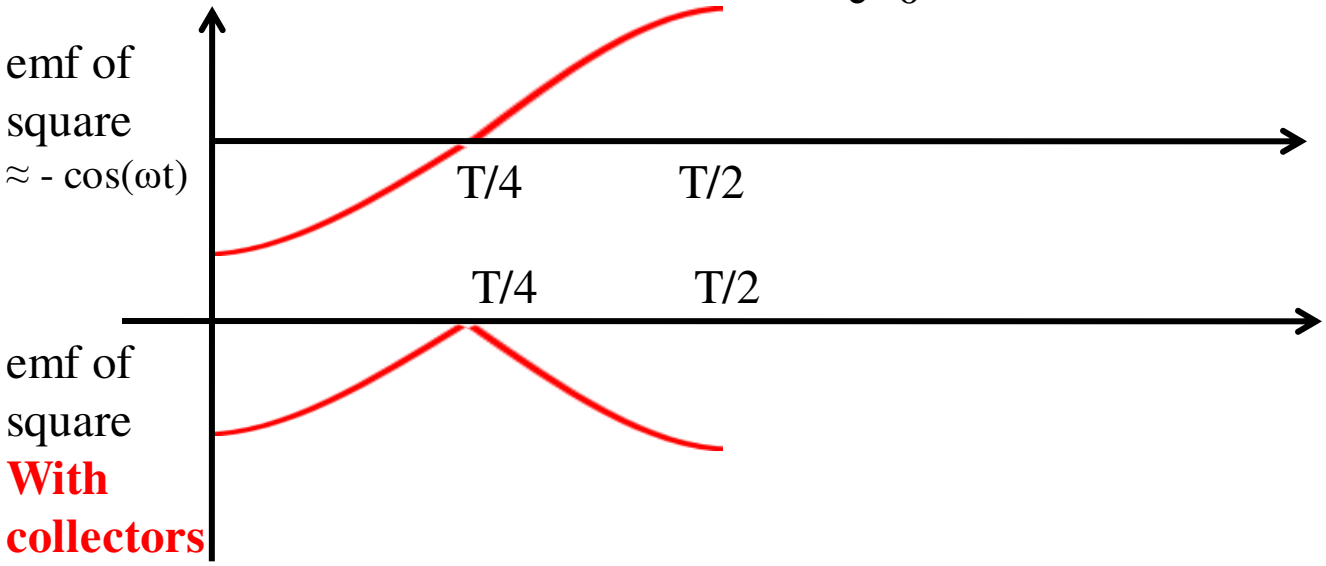


Electromotive force- with collector/brushes : FIRST HALF PERIOD

For t [0, T/4] dΦ>0 so e ≈ -dΦ<0

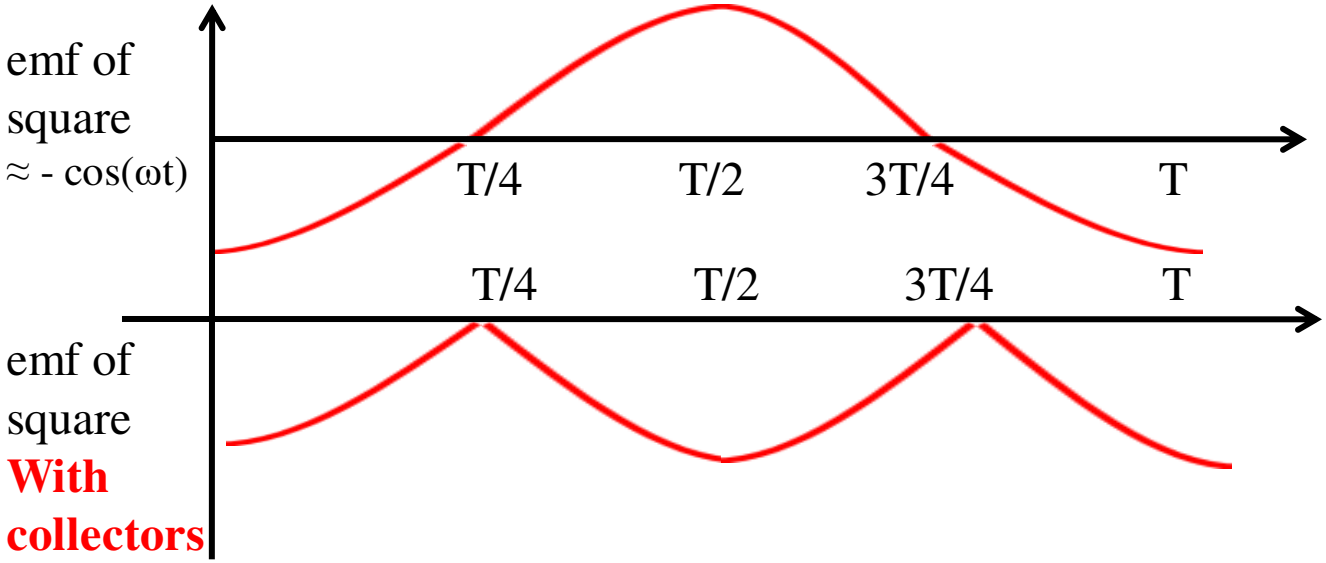
For t [T/4, T/2] dΦ<0
so e ≈ -dΦ> 0 changes
BUT collector changes also
So e <0
Stays <0



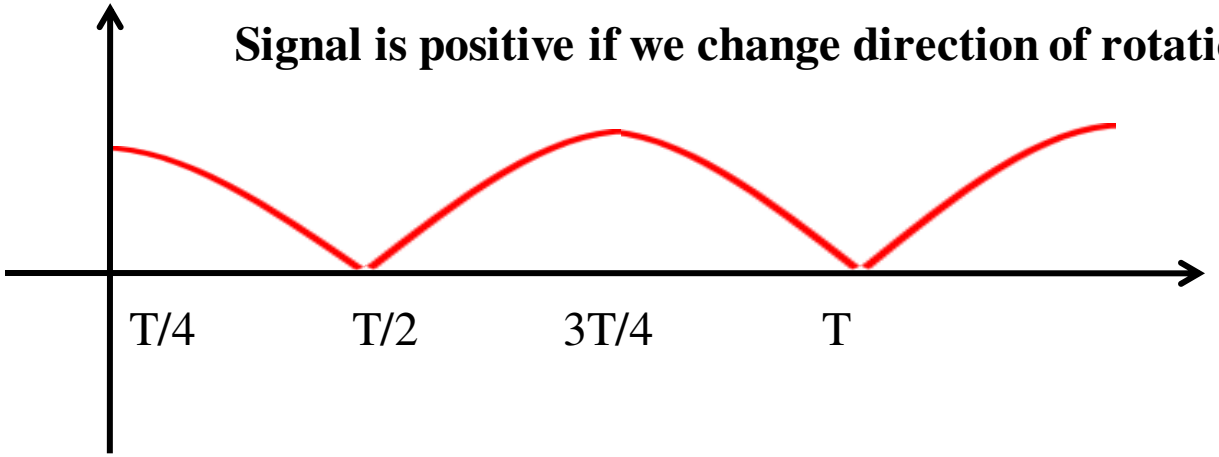


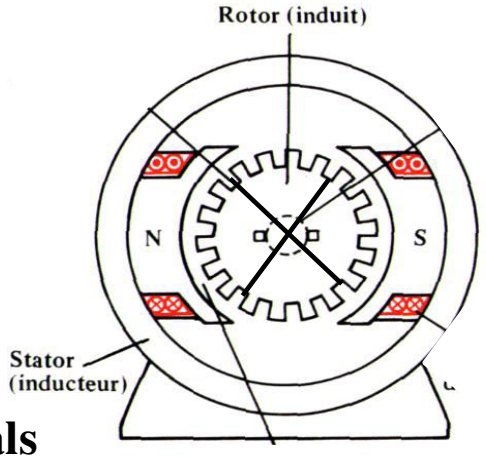
Electromotive force- with collector/brushes :

Duringsecond half period , principle is similar we obtain a purely negative signal

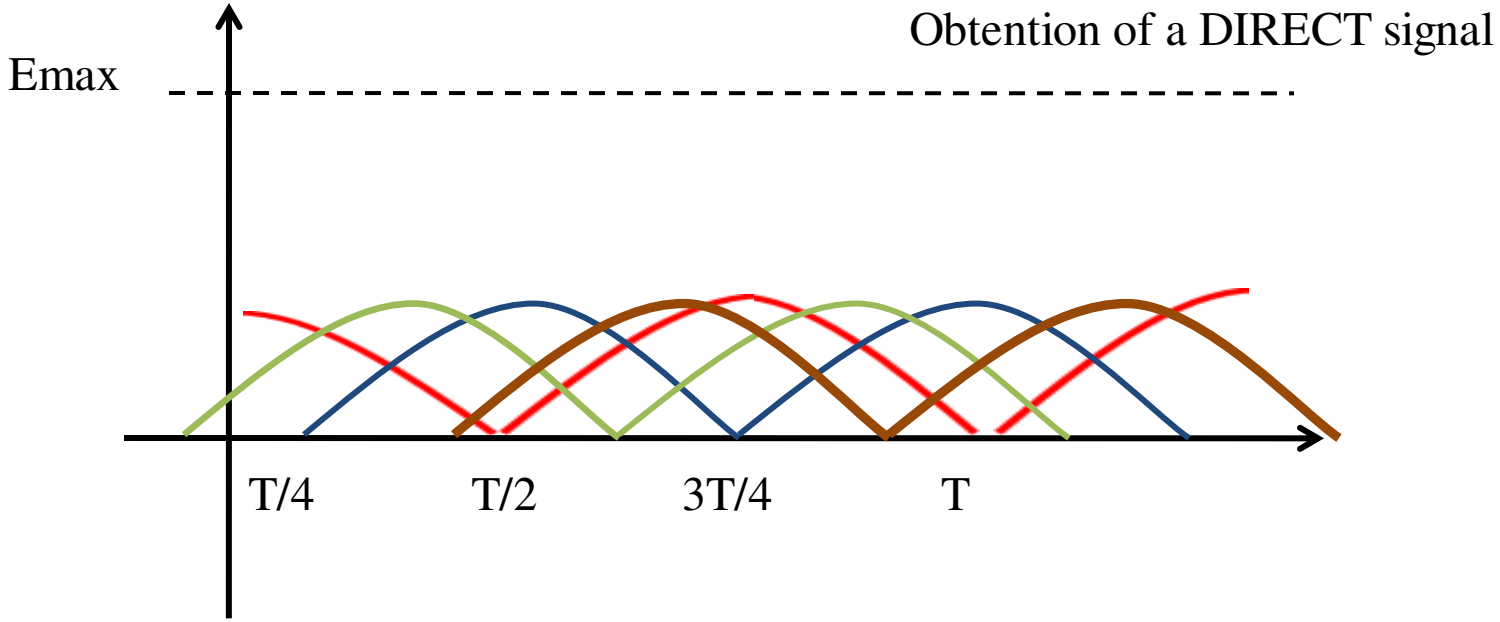


Signal is positive if we change direction of rotation !!





Existence of many loops: <u>superposition of signals</u>



Physics-L2 Electromagnetism

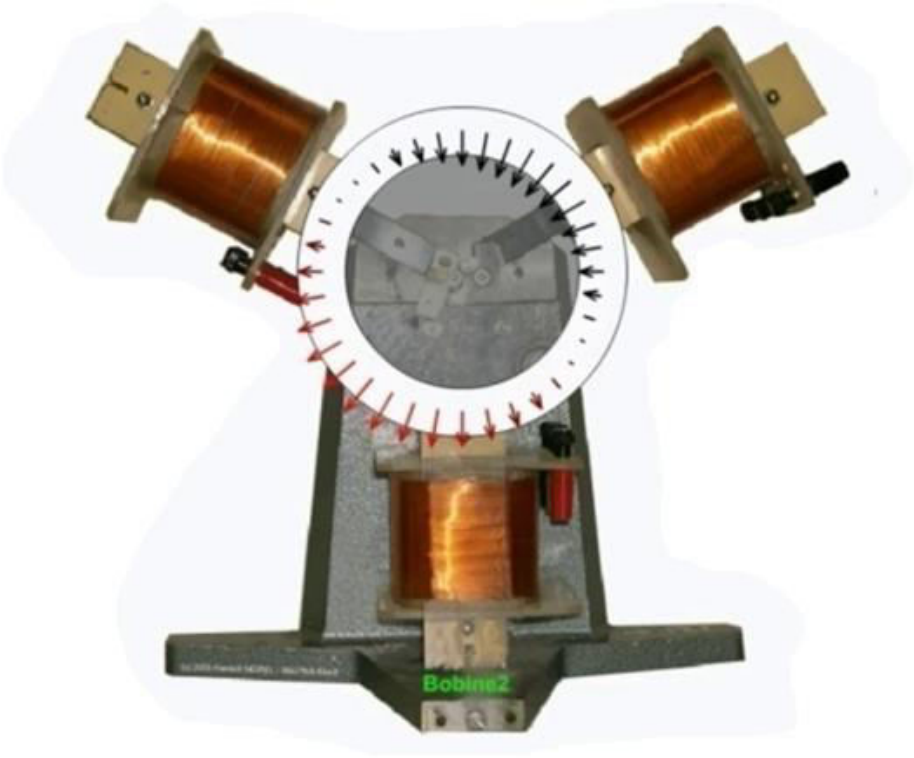
Approximative program

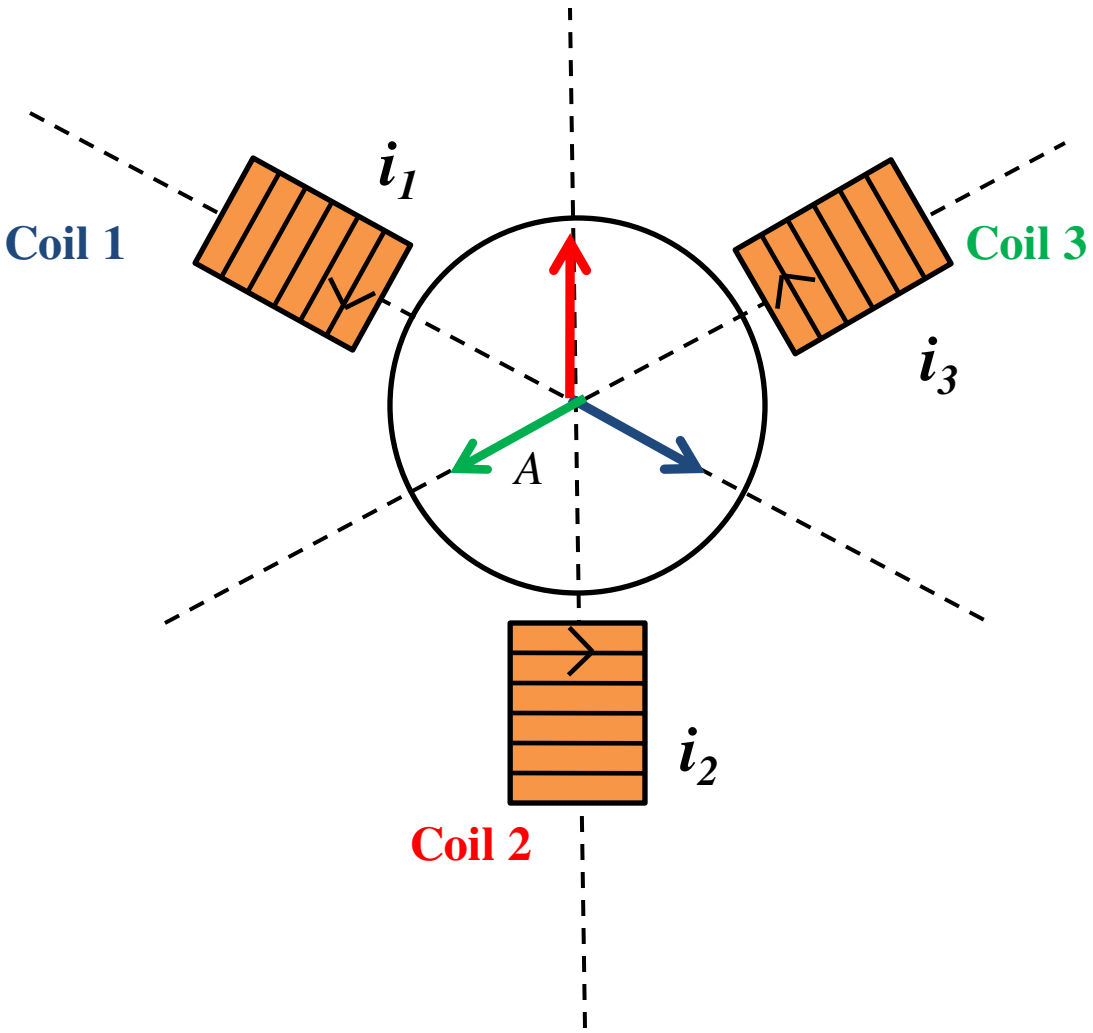
Chap 1: Electrostatics
Chap 2: Magnetostatics
Chap 3: Time-dependent regime-Induction phenomena

Integrated course: Electro-mechanical conversion

1. **Principles of DC Motor**
2. **Principle of AC Synchrone Motor**
3. **Principle of a Loud-Speaker**

Chap 4: Maxwell equations
Chap 5: Dielectric media and applications
Chap 6: Conducting media and applications
Chap 7: Magnetic media and applications


Bobina2

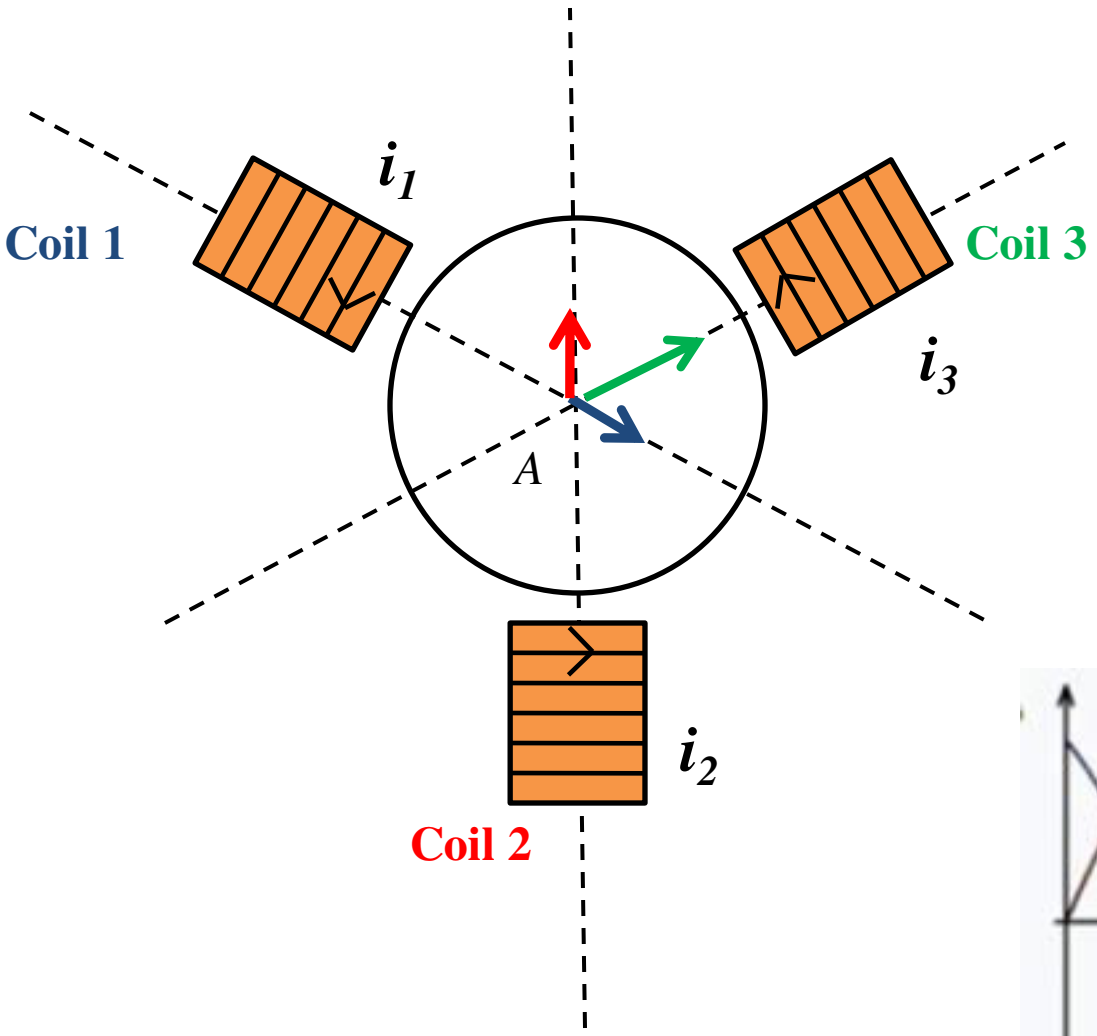


B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3

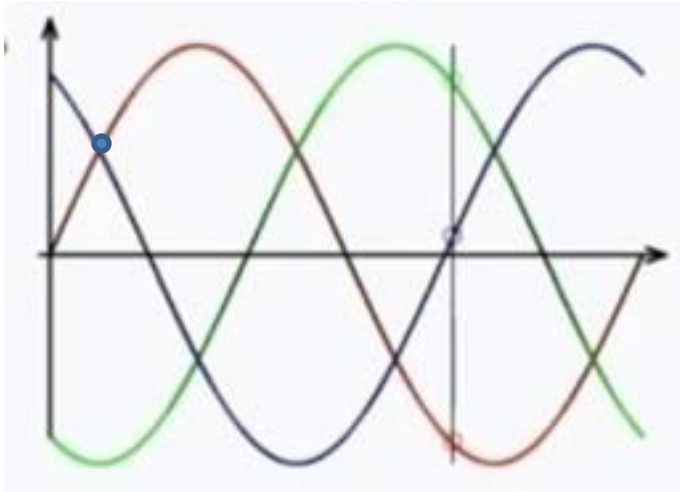


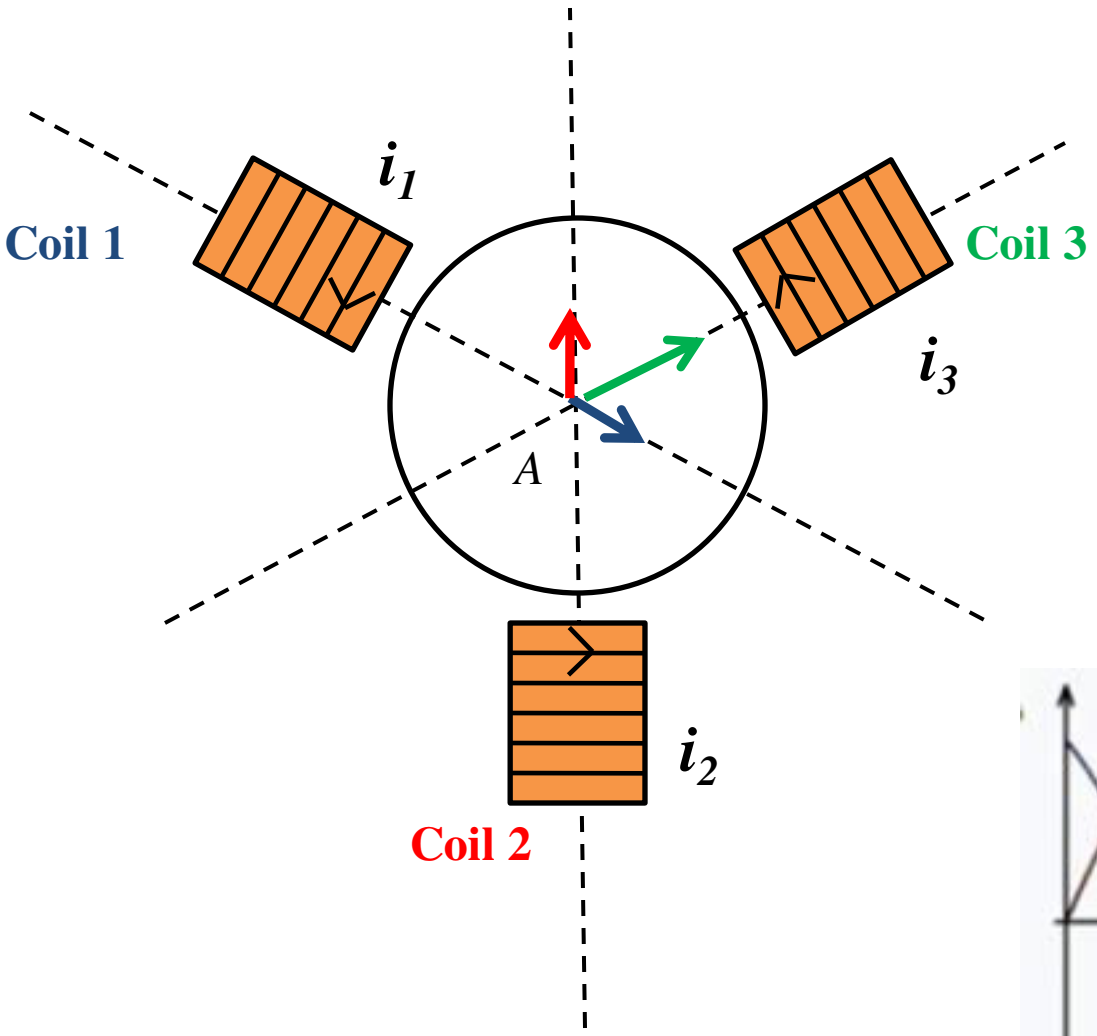
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3



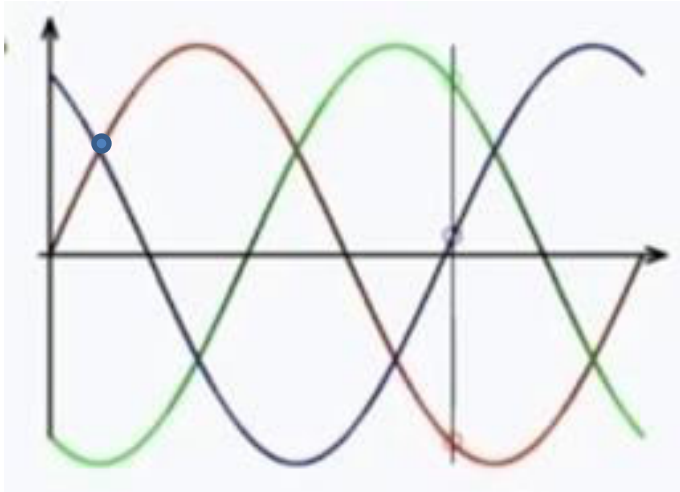


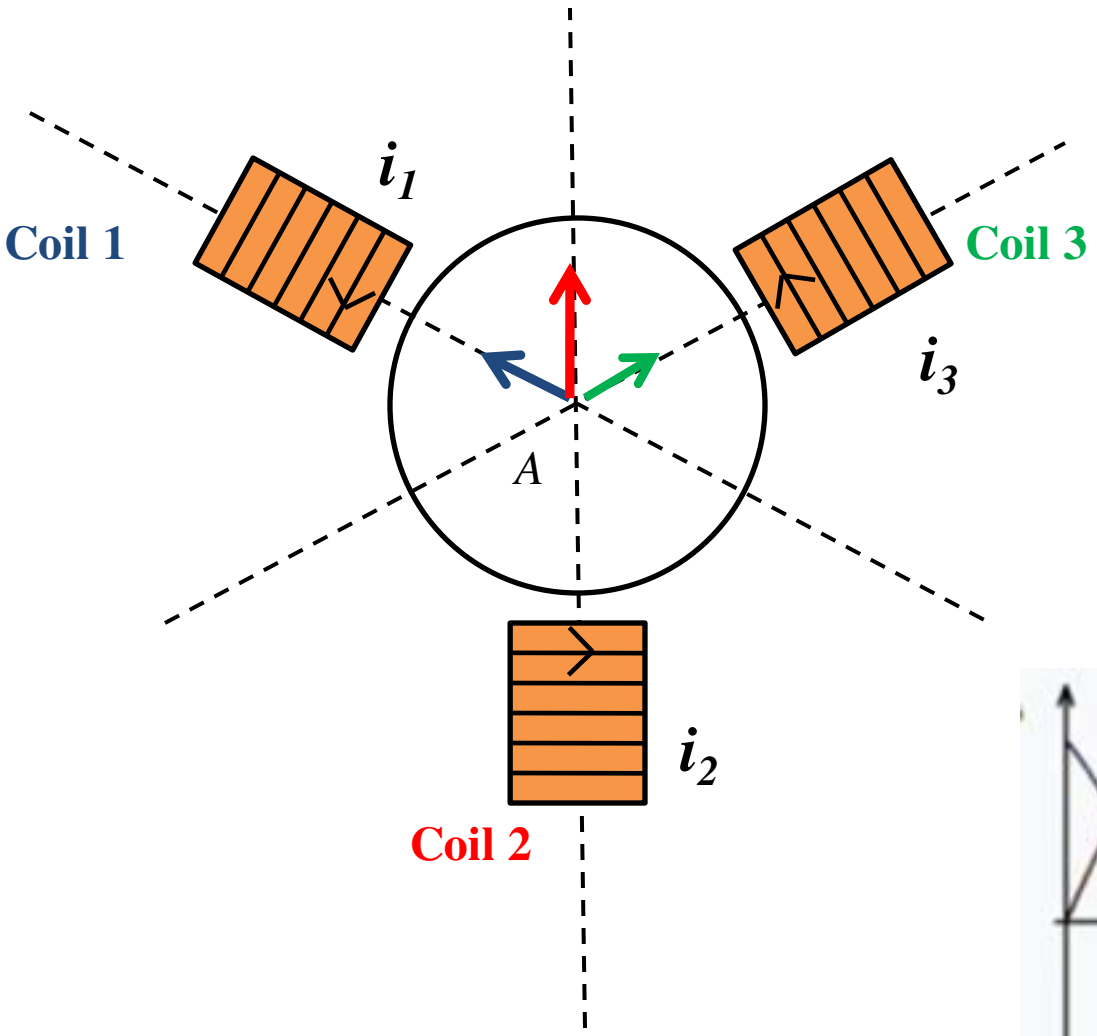
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3



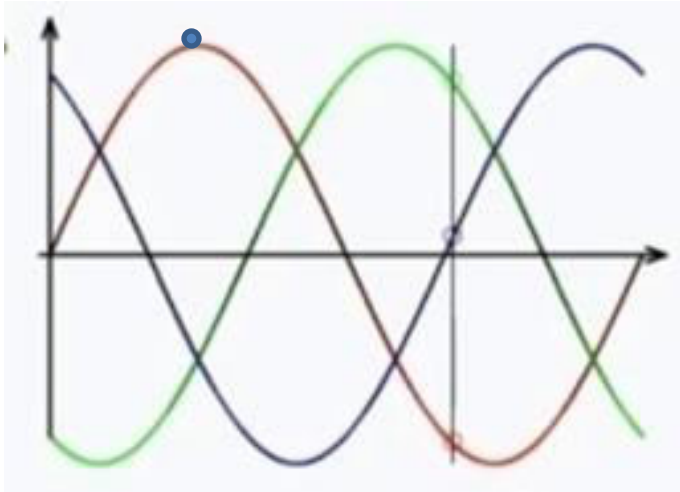


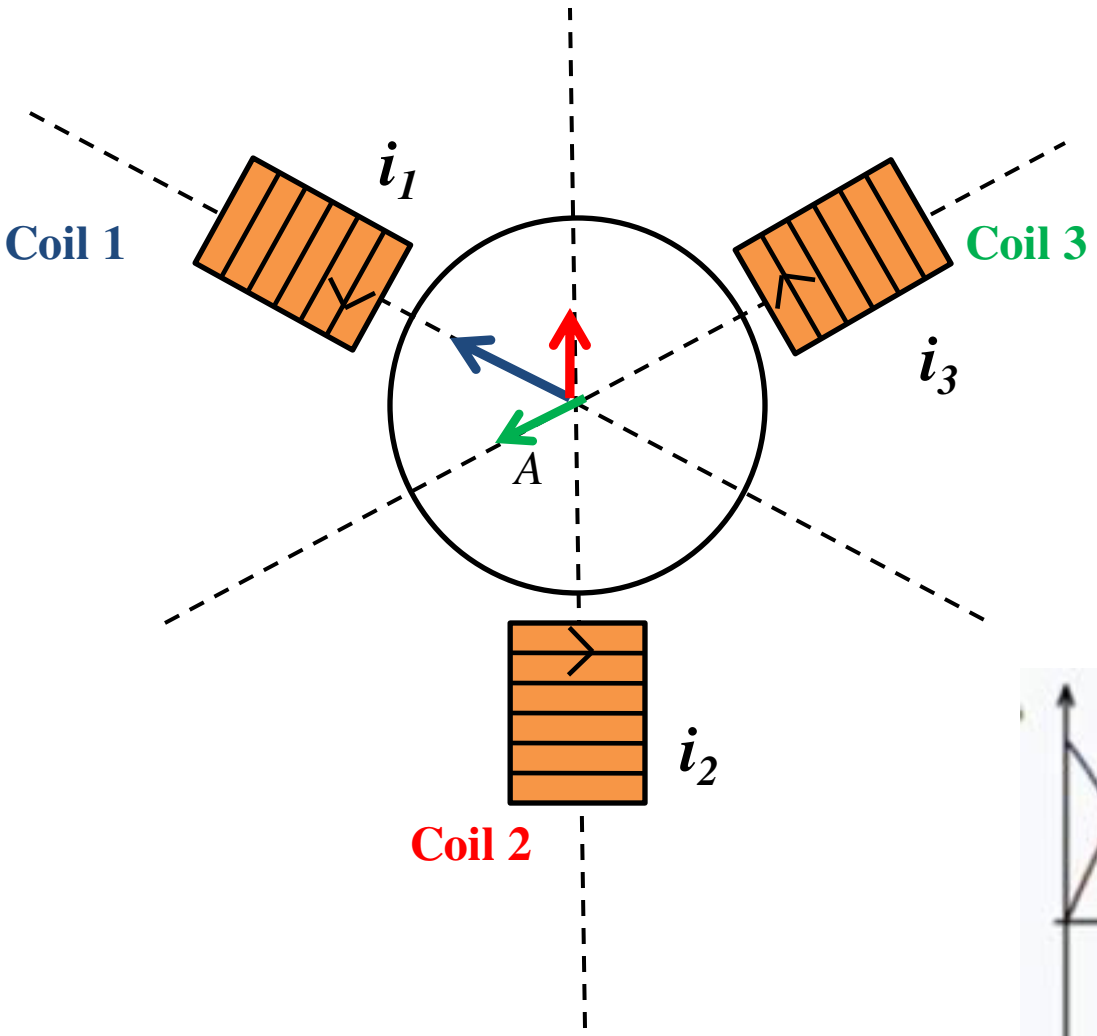
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3



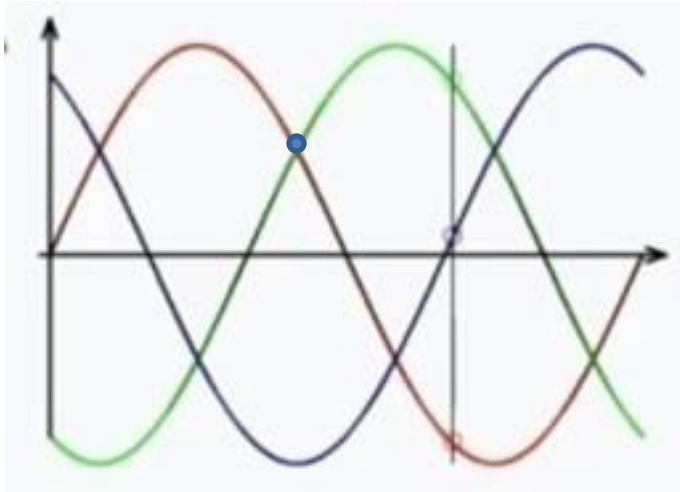


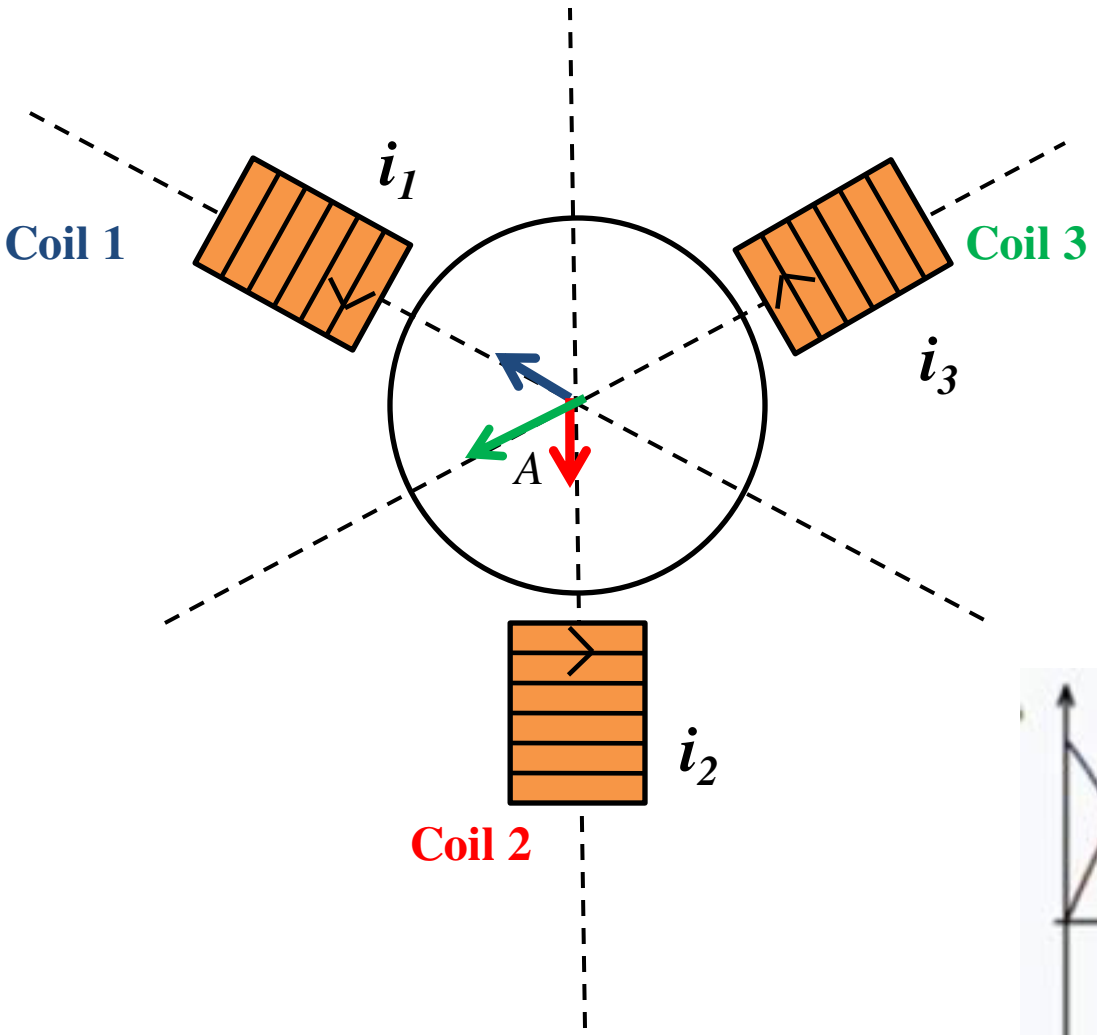
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3



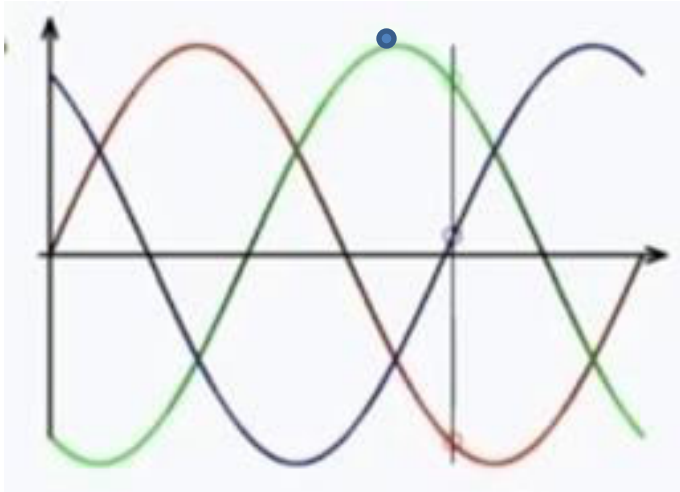


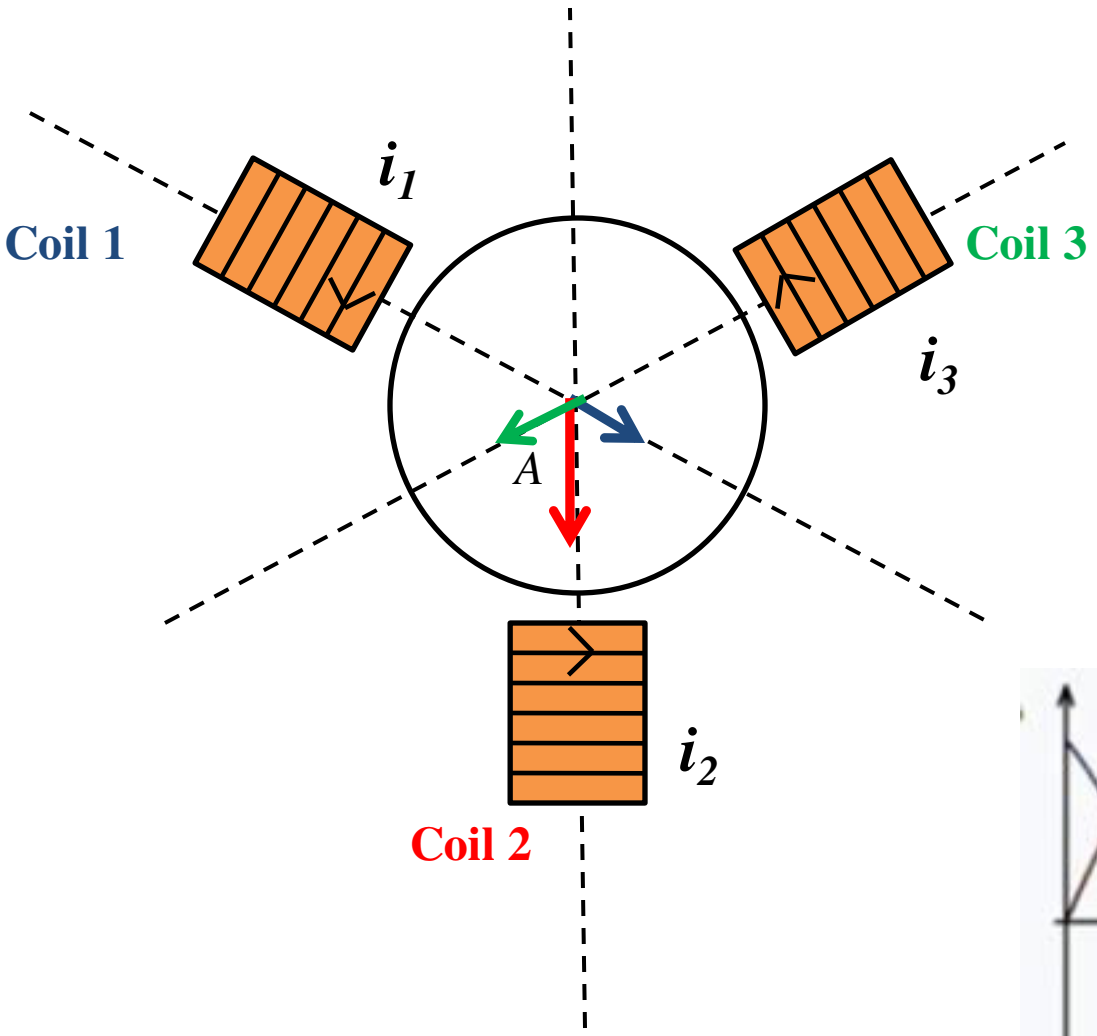
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3



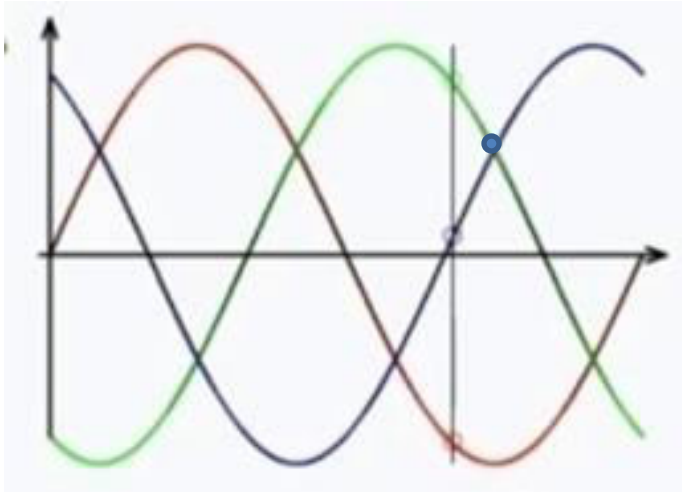


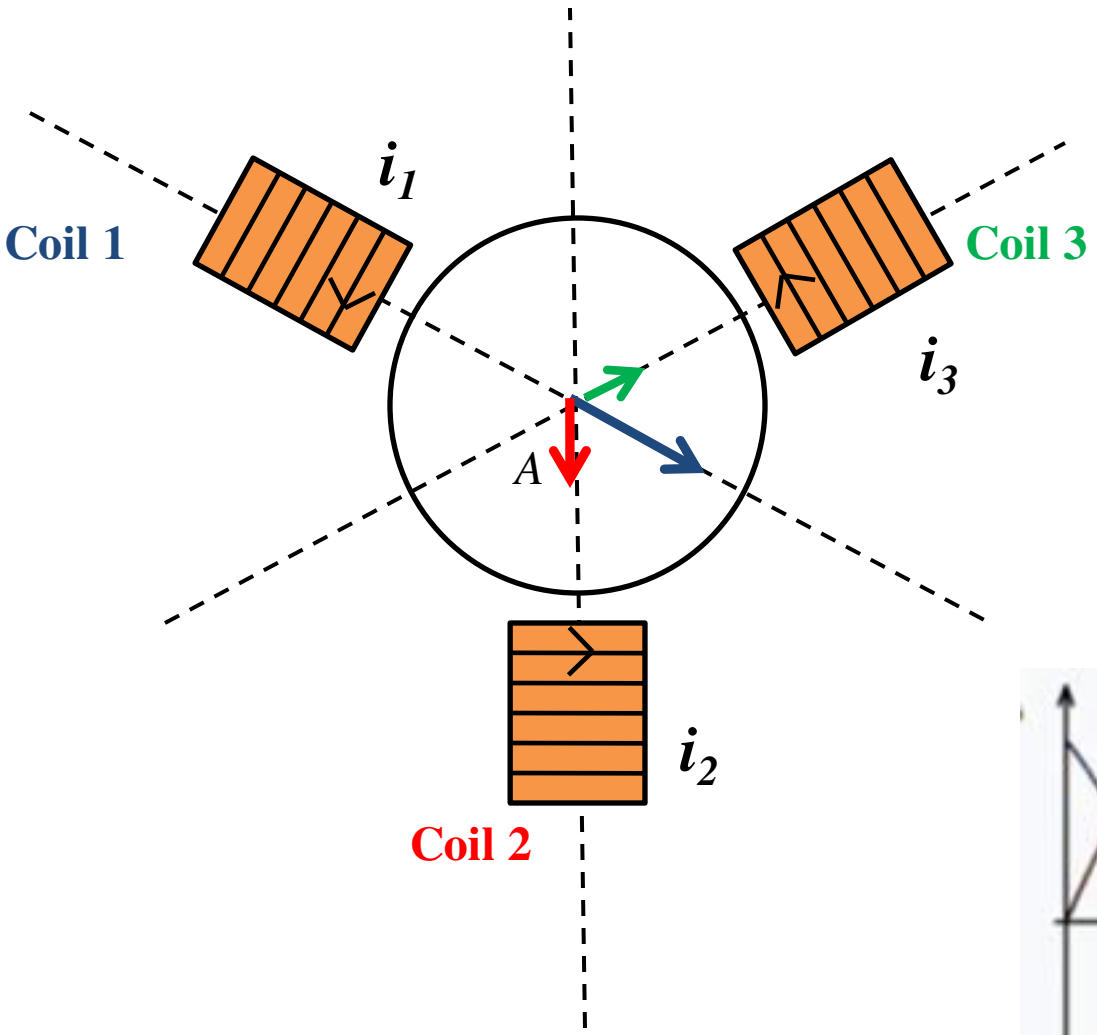
B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3





B1 produced by i1 of C1

B2 produced by i2 of C2

B3 produced by i3 of C3

Btotal=B1+B2+B3