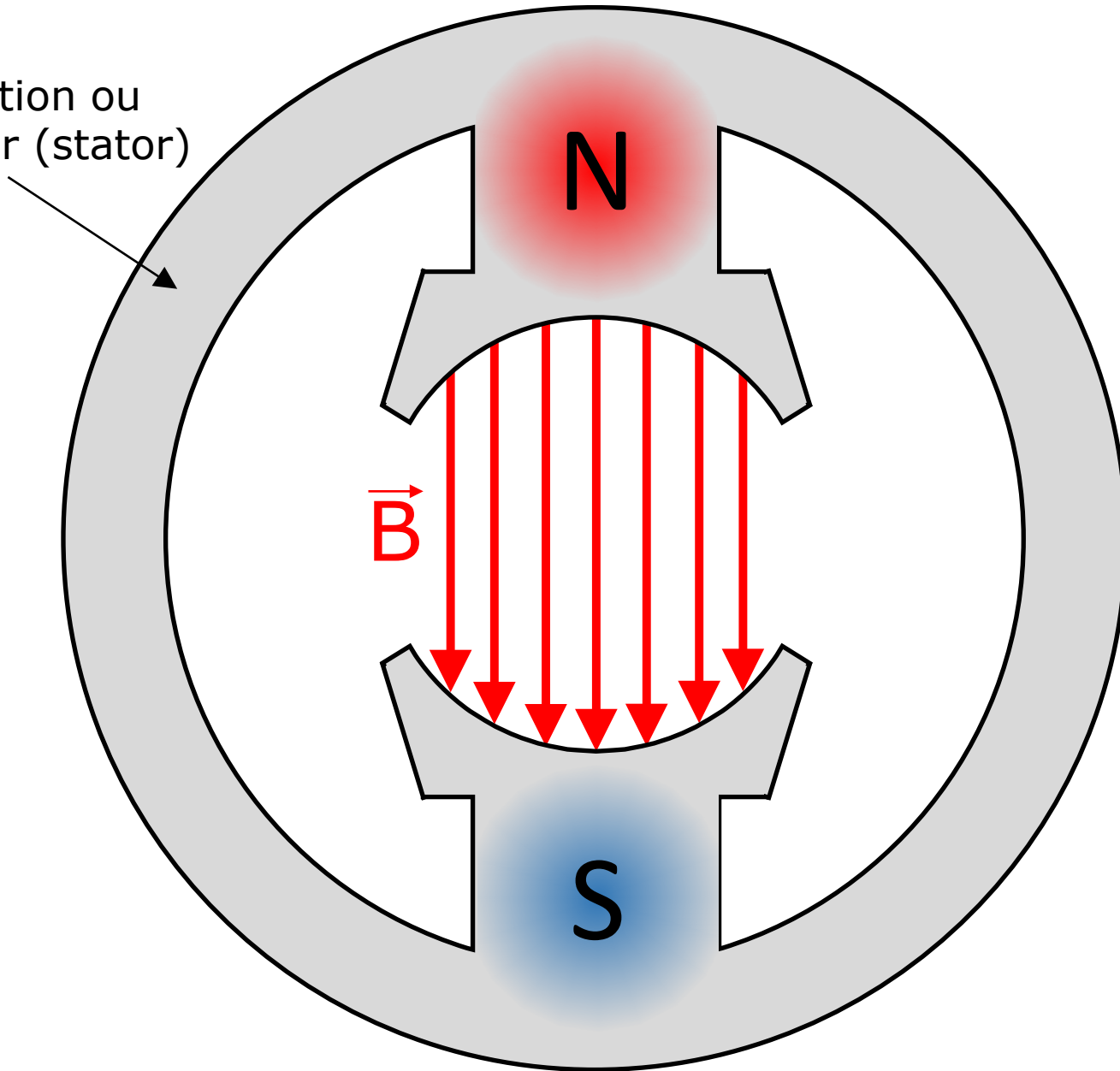


# Le moteur à courant continu

## Le moteur DC

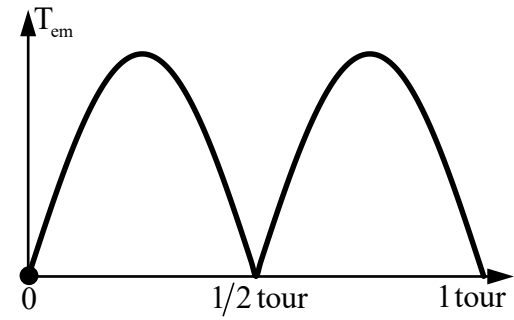
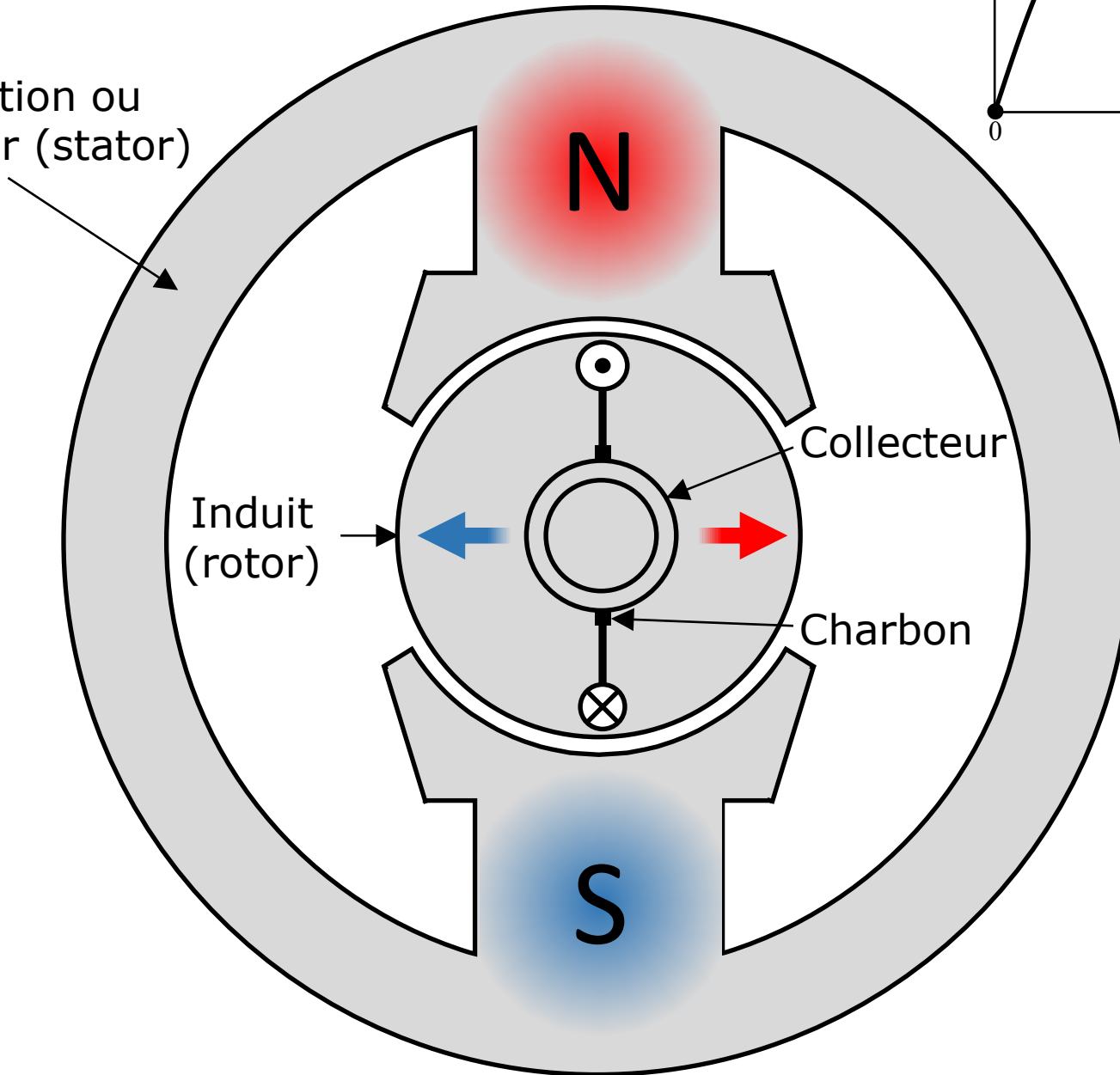
# Principe de fonctionnement

Excitation ou inducteur (stator)



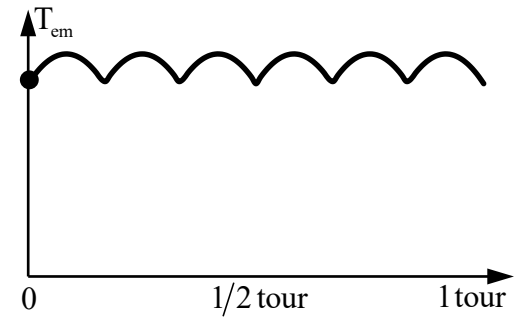
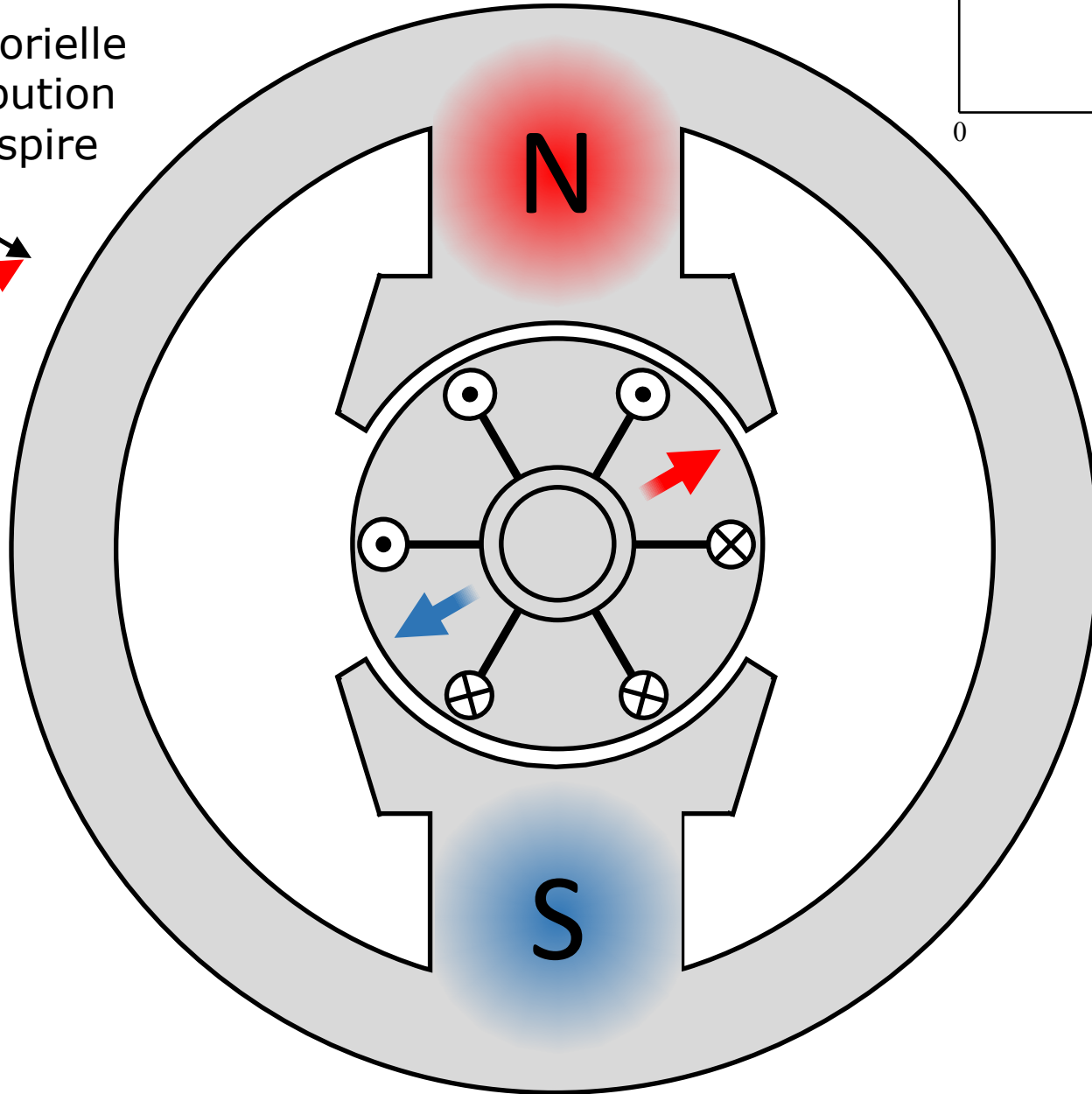
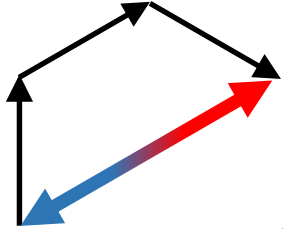
# Principe de fonctionnement

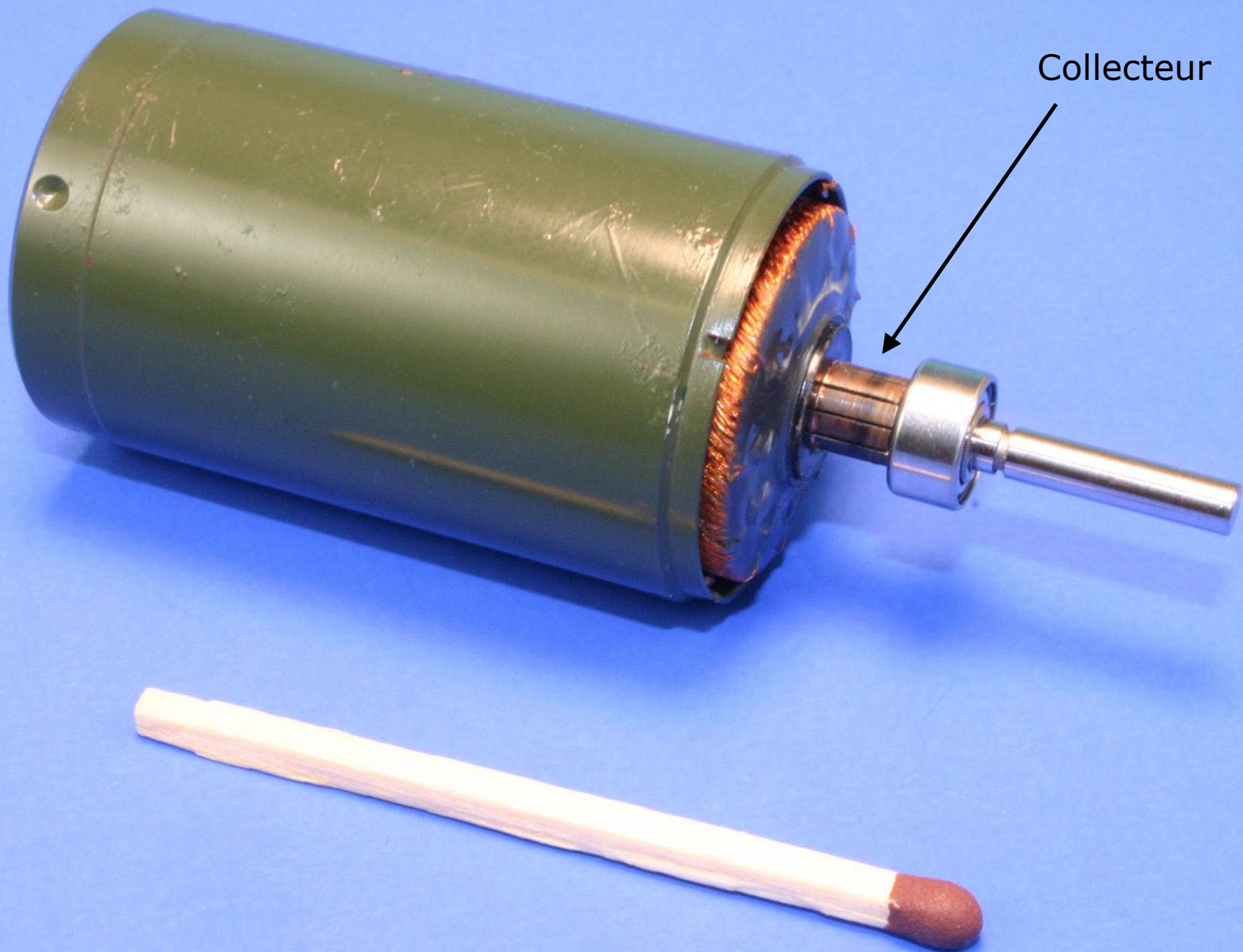
Excitation ou inducteur (stator)



# Principe de fonctionnement

Somme vectorielle  
de la contribution  
de chaque spire





Collecteur

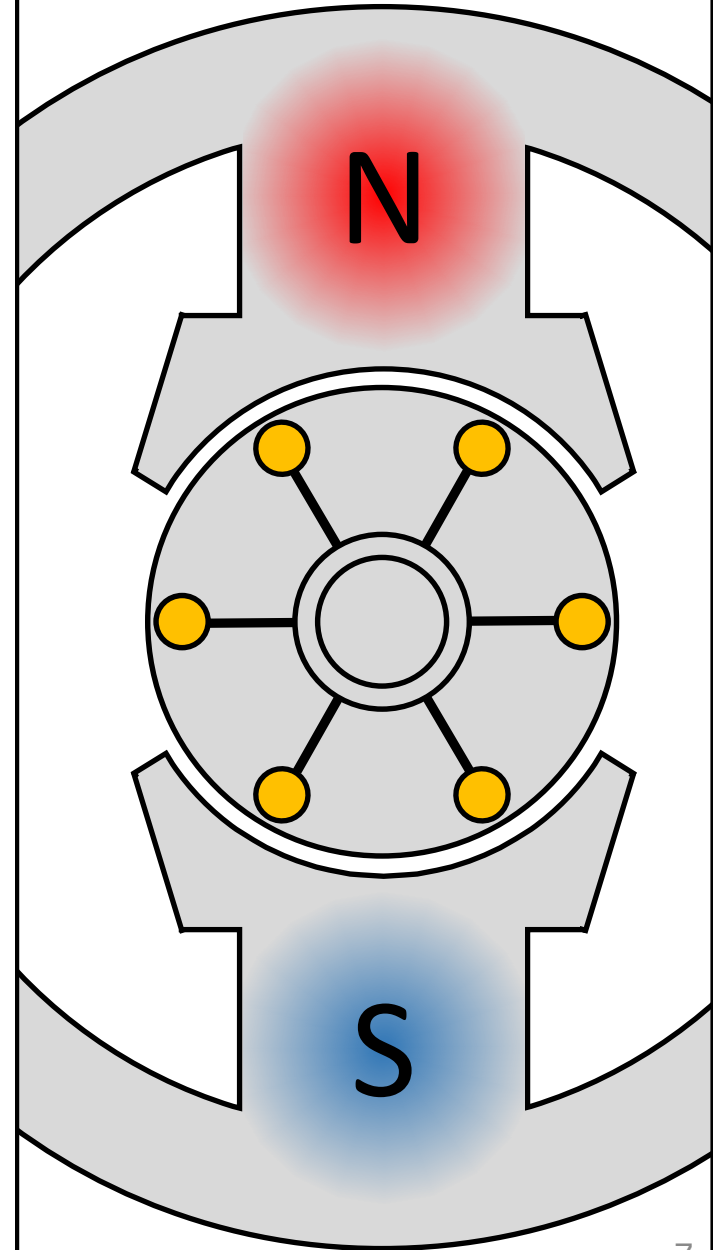
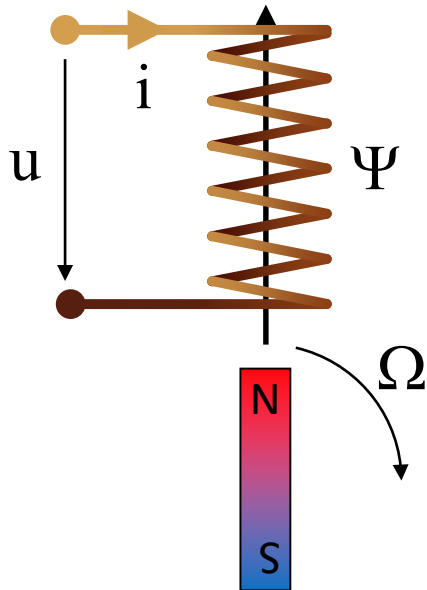
# Tension induite généralisée

$$u = R i + \frac{d\Psi}{dt}$$

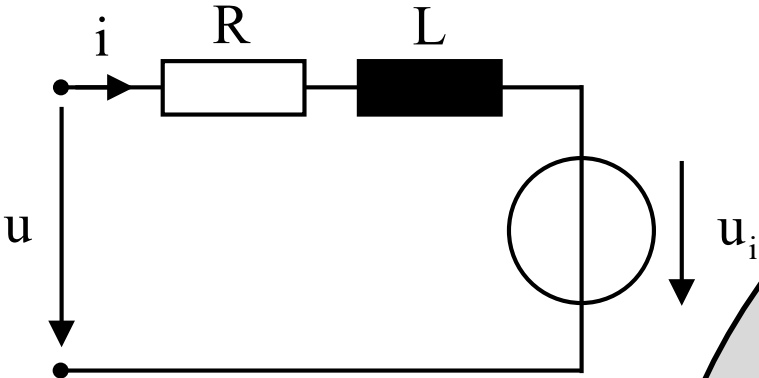
$$u = R i + L \frac{di}{dt} + k_{\phi} \Omega$$

Tension induite de transformation

Tension induite de mouvement



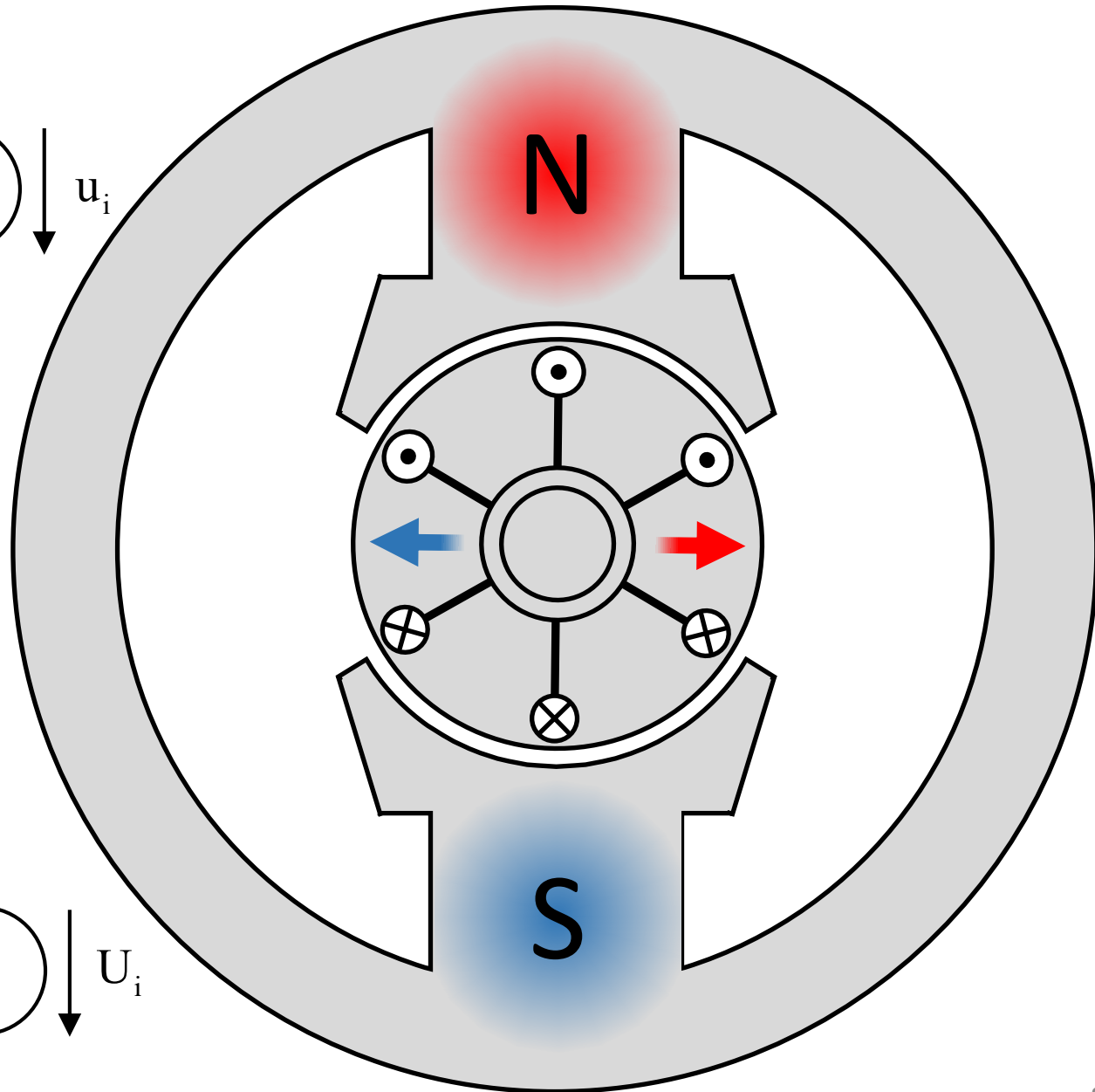
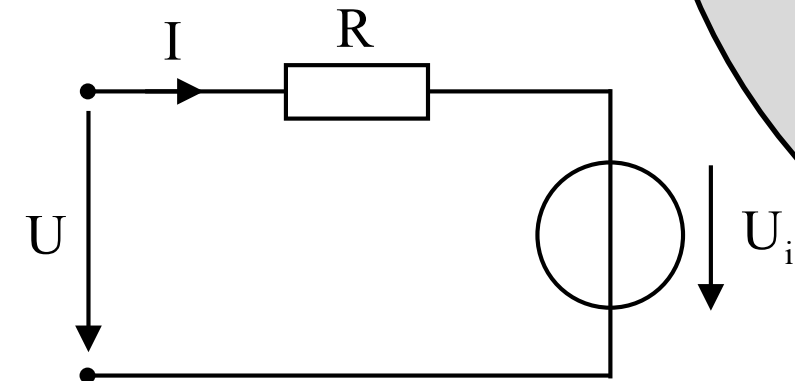
# Principe de fonctionnement et schéma équivalent



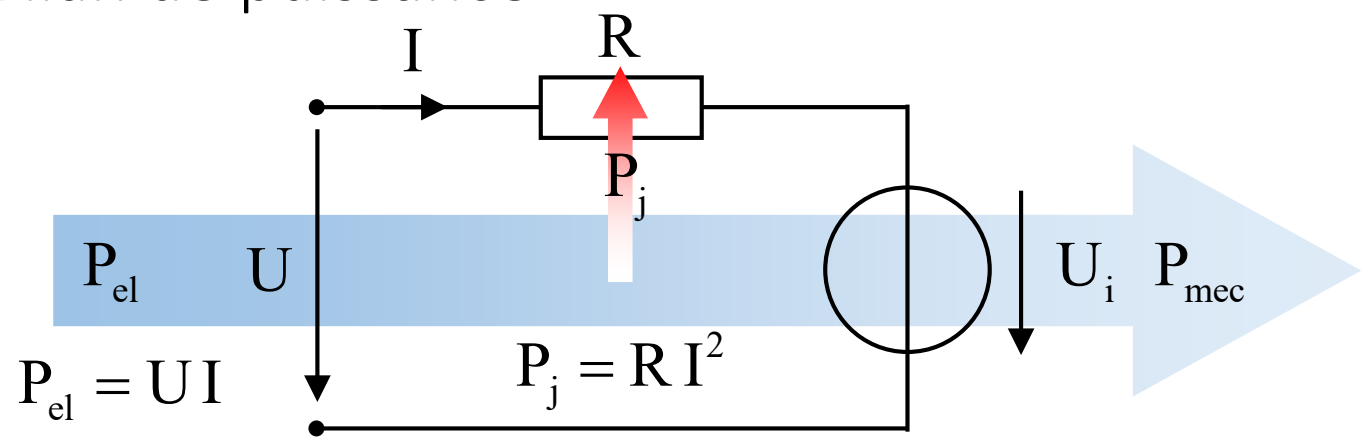
$$u = Ri + L \frac{di}{dt} + u_i$$

régime  
permanent

$$U = RI + U_i$$



# Bilan de puissance



$$P_{el} = P_j + P_{mec}$$

$$P_{mec} = \Omega T_{em} = U_i I \longrightarrow T_{em} = \frac{P_{mec}}{\Omega} = \frac{U_i I}{\Omega} = \frac{k_\Phi \Omega I}{\Omega} = k_\Phi I$$

$U_i = k_\Phi \Omega$

La tension induite est proportionnelle à la vitesse de rotation

$T_{em} = k_\Phi I$

Le couple est proportionnel au courant



# Caractéristique de couple

$$U = R I + U_i$$

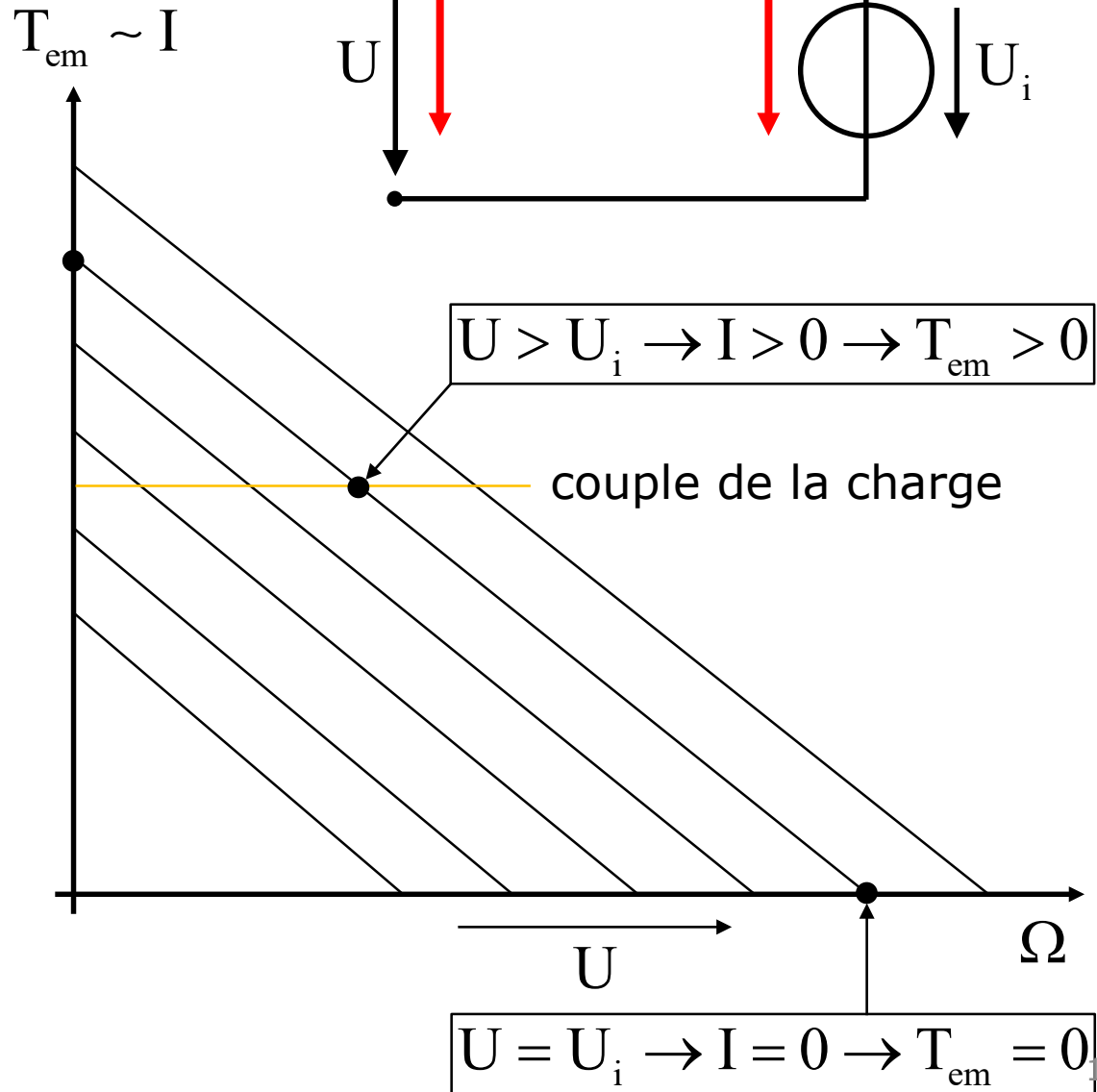
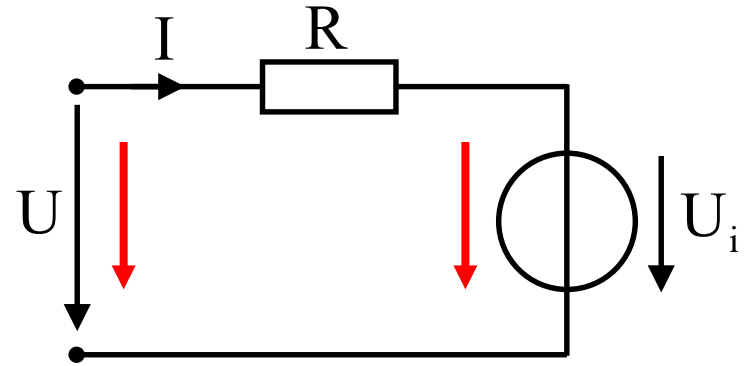
$$U_i = k_\Phi \Omega$$

$$T_{em} = k_\Phi I$$

$$U = R I + k_\Phi \Omega$$

$$I = \frac{U - k_\Phi \Omega}{R} = \frac{T_{em}}{k_\Phi}$$

$$T_{em} = k_\Phi \frac{U - k_\Phi \Omega}{R}$$



# Démarrage d'un moteur à courant continu 1.8 kW

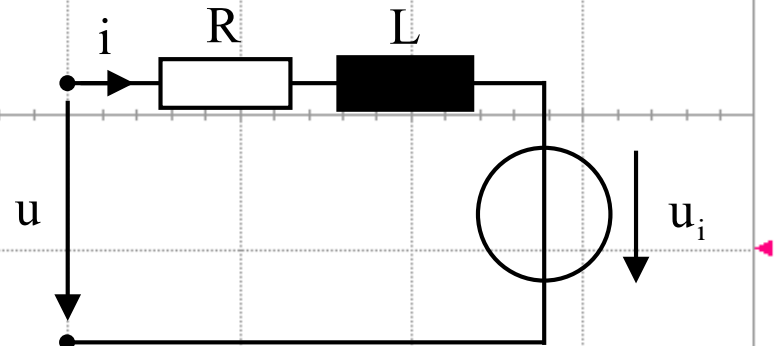
Démarrage à demi tension 100V (750 tr/min à vide)

Montée exponentielle

Décroissance avec  
l'augmentation de  
la vitesse

750 [tr / min]

0 [tr / min]



C2	F [BwL] DC	C4	F [BwL] DC
5.00 A/div	10.0 V/div		
-15.000 A ofst	-30.000 V ofst		

Timebase	-198 ms	Trigger	C2 [DC]
50.0 ms/div	Stop	10.00 A	
10.0 kS	20 kS/s	Edge	Positive