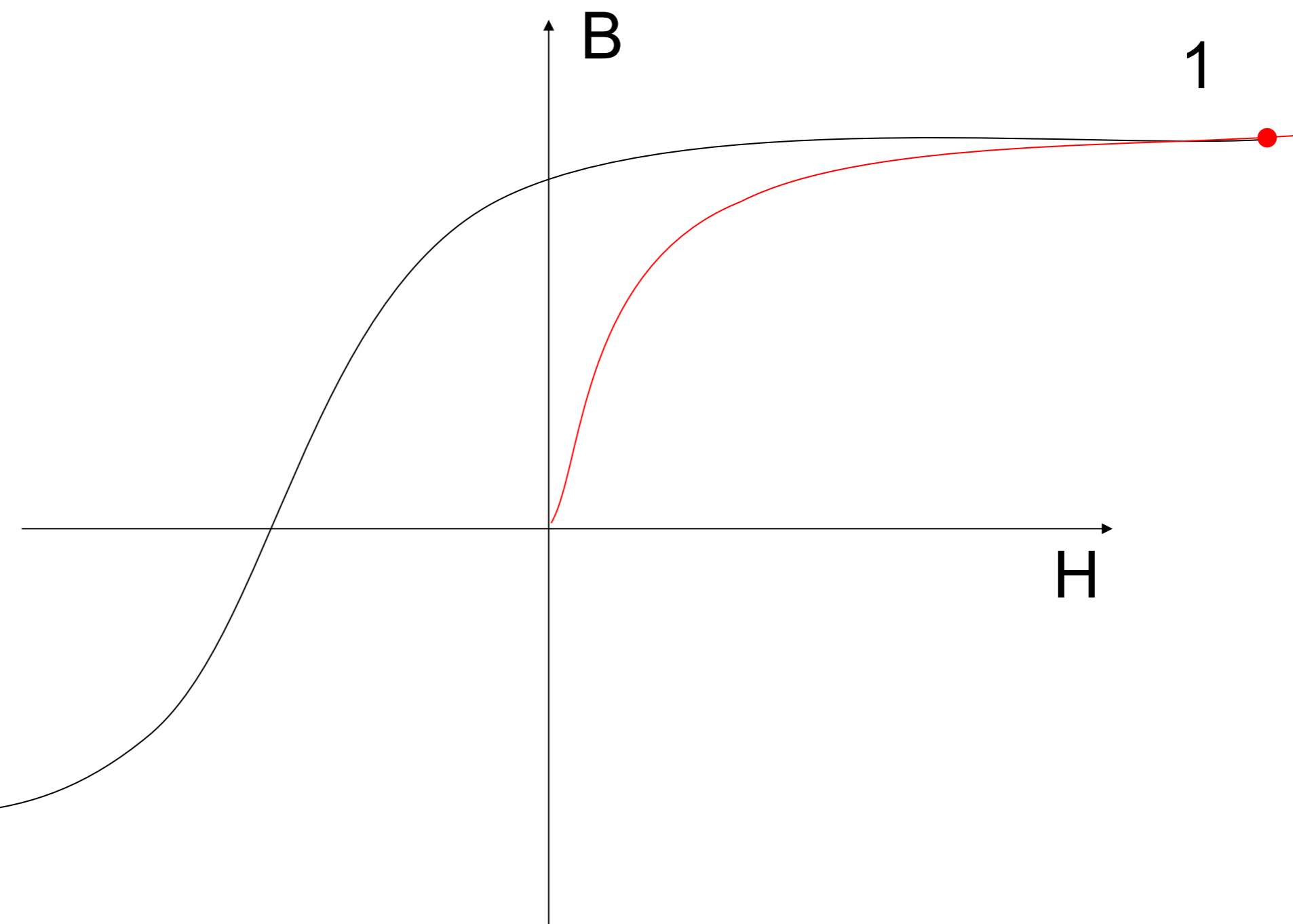
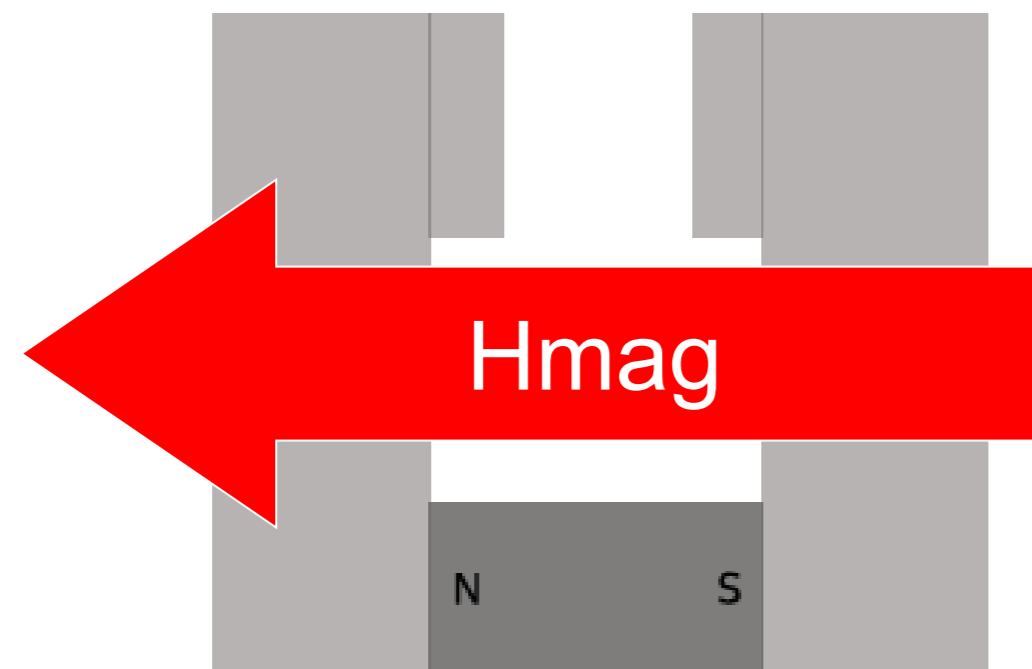


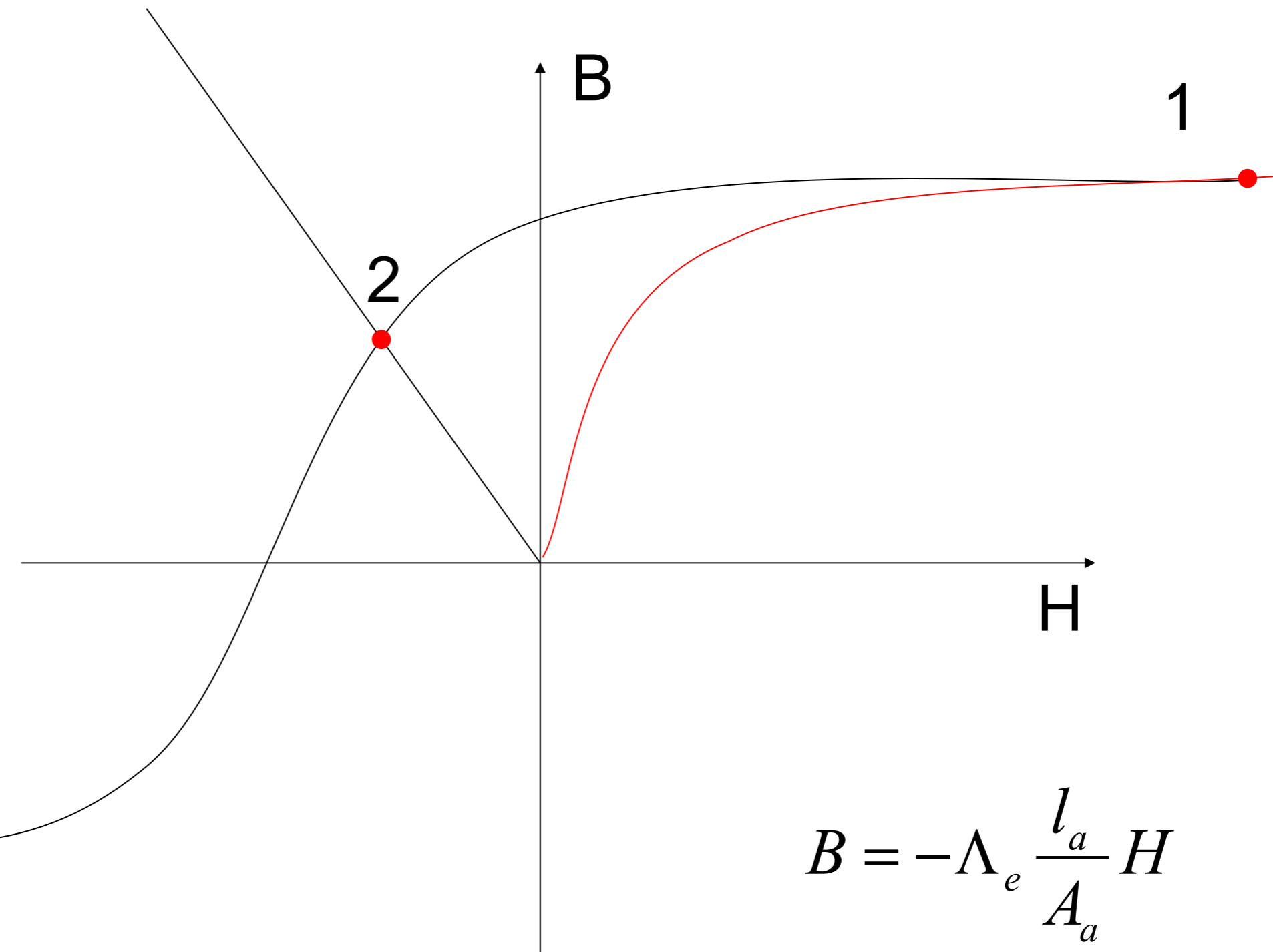
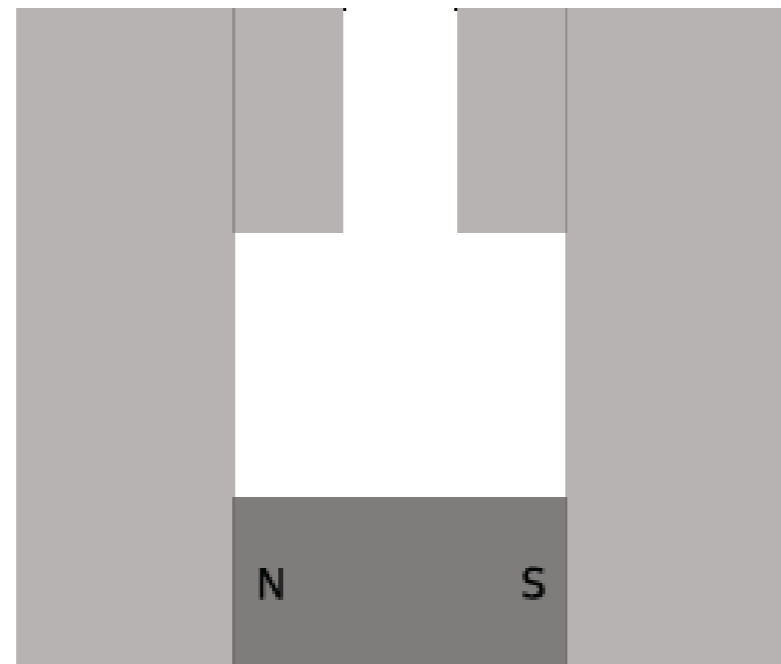
EPFL

Aimants: résumé

Actionneurs et systèmes électromagnétiques



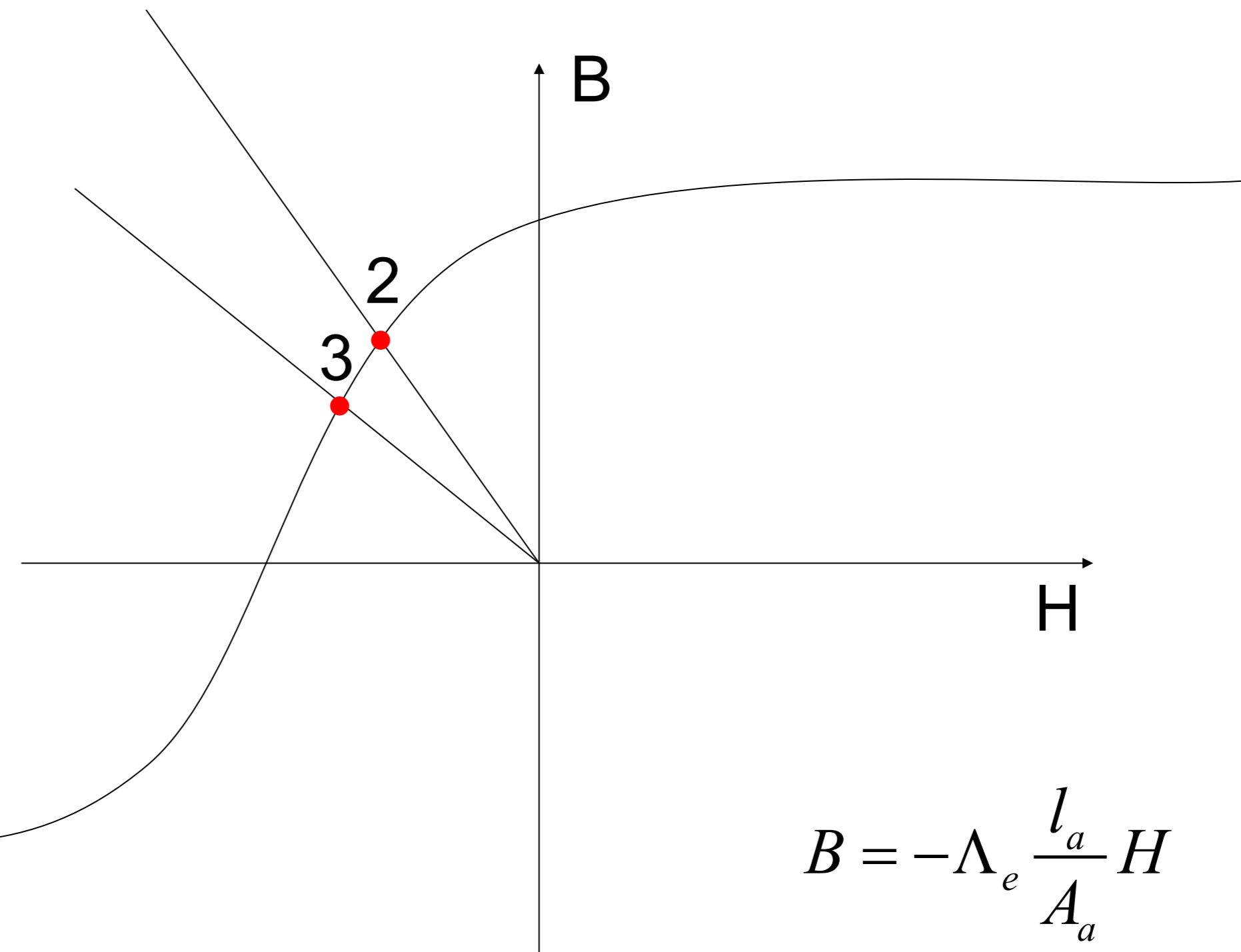
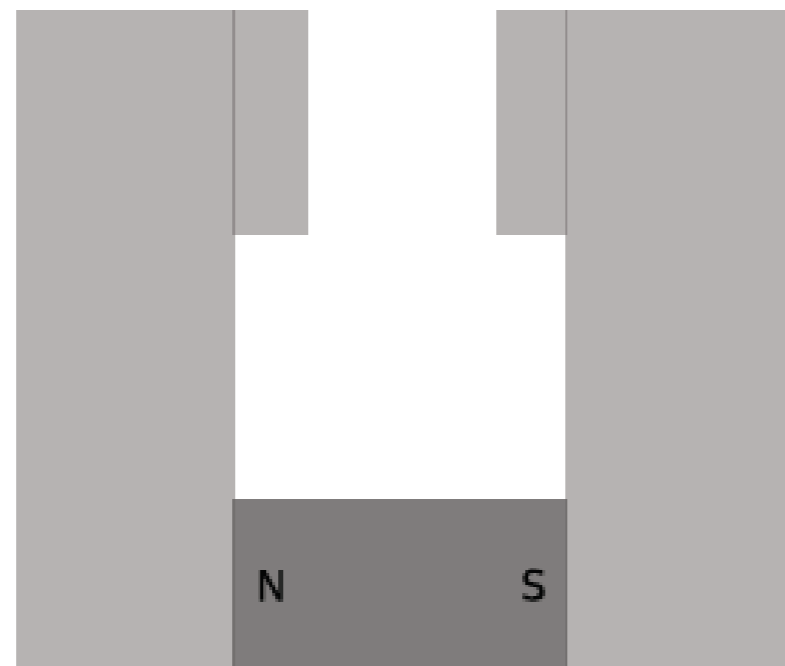
- 1) **Magnétisation**
- 2) Système au repos
- 3) Ouverture entrefer
- 4) Fermeture entrefer
- 5) Champ externe



- 1) Magnétisation
- 2) **Systeme au repos**
- 3) Ouverture entrefer
- 4) Fermeture entrefer
- 5) Champ externe

$$B = -\Lambda_e \frac{l_a}{A_a} H$$

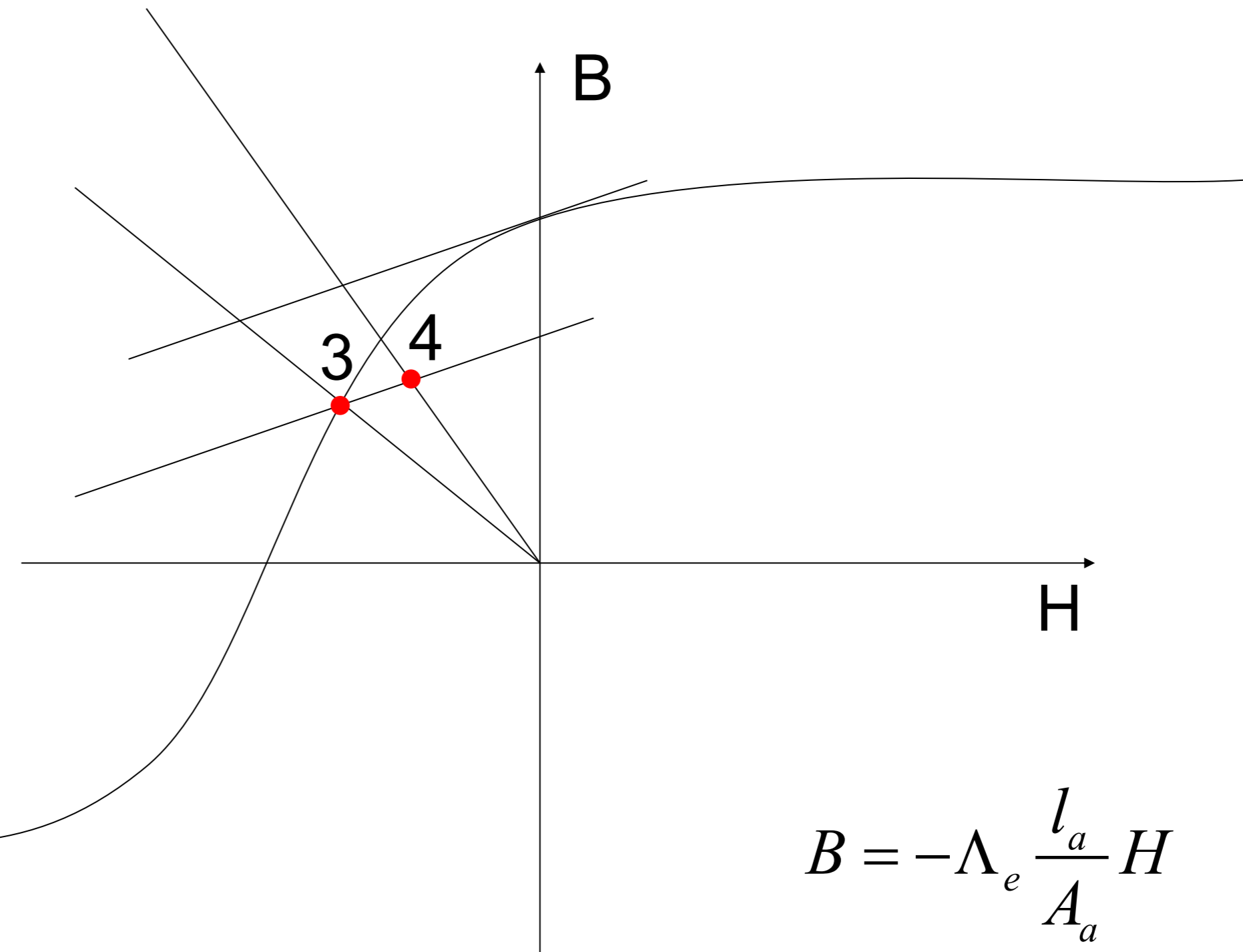
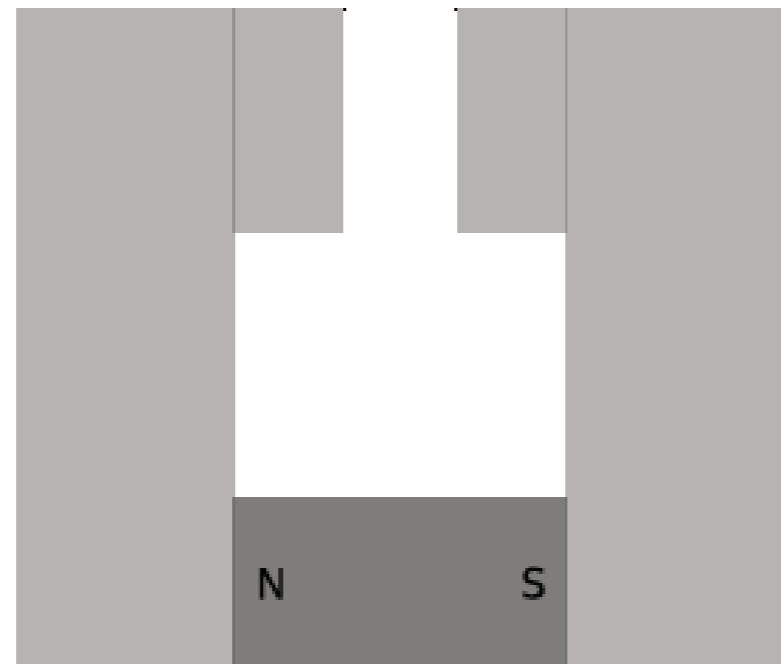
$$B = B_0 + \mu_d H$$



- 1) Magnétisation
- 2) Système au repos
- 3) **Ouverture entrefer**
- 4) Fermeture entrefer
- 5) Champ externe

$$B = -\Lambda_e \frac{l_a}{A_a} H$$

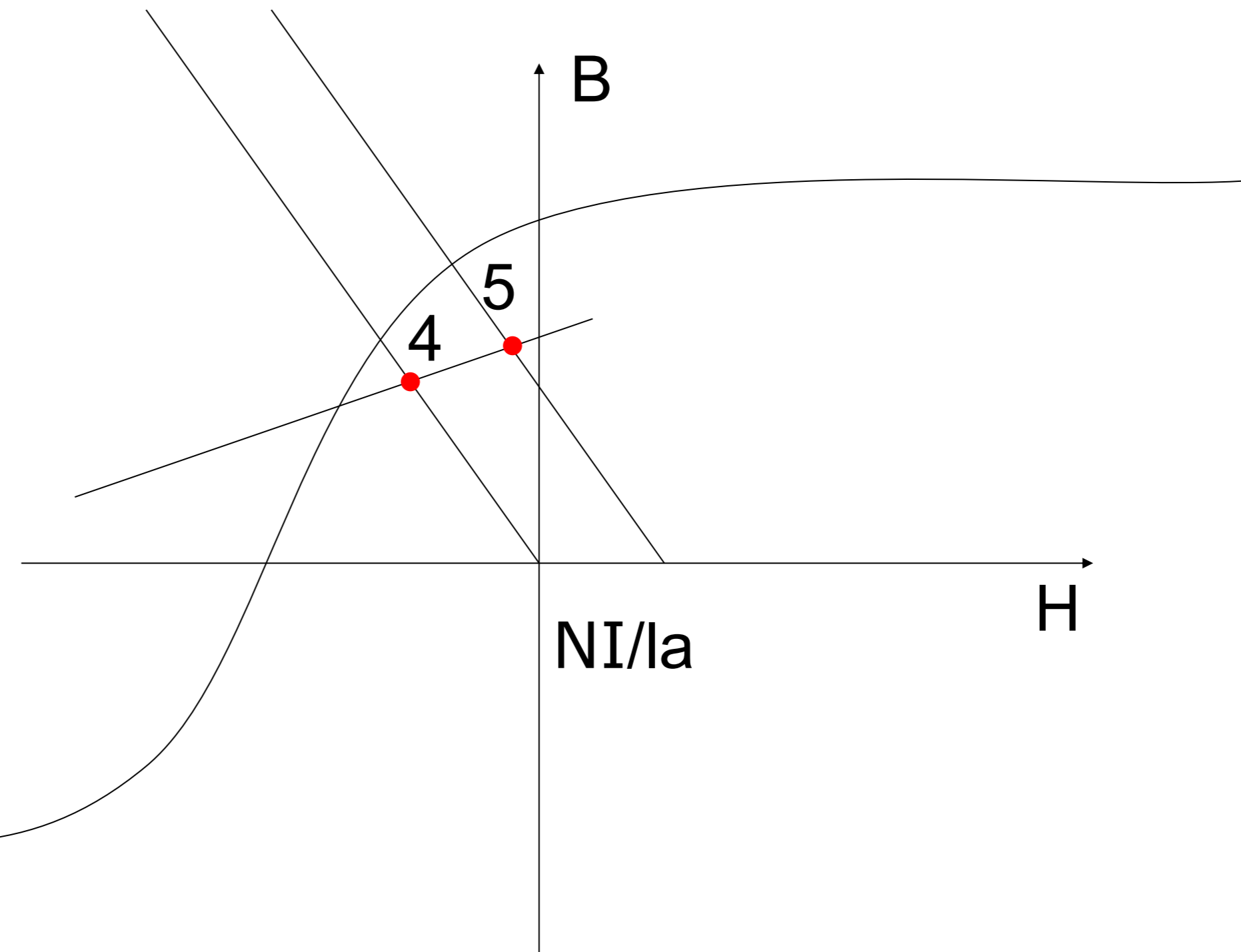
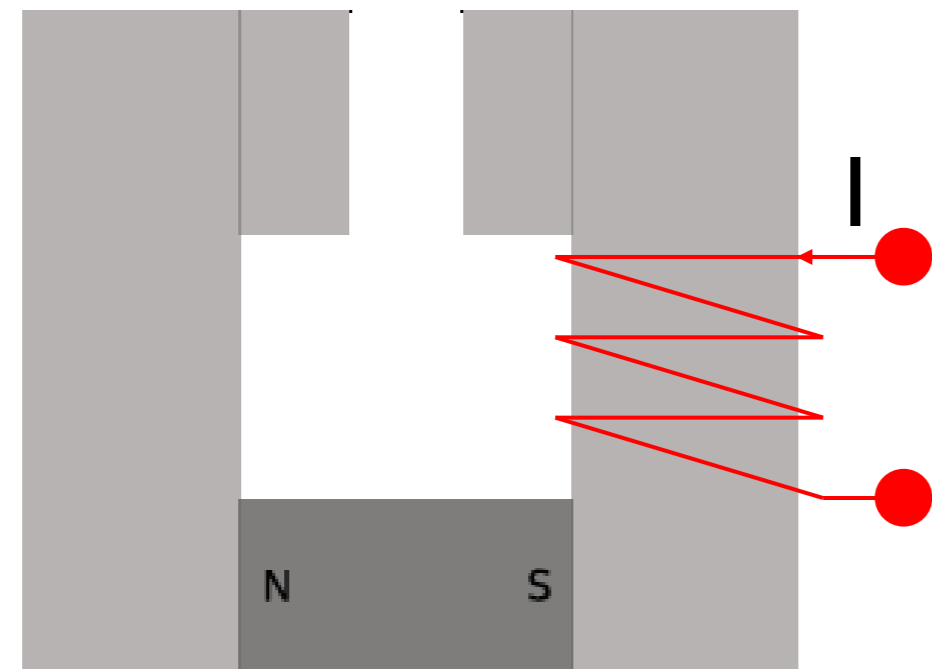
$$B = B_0 + \mu_d H$$



- 1) Magnétisation
- 2) Système au repos
- 3) Ouverture entrefer
- 4) **Fermeture entrefer**
- 5) Champ externe

$$B = -\Lambda_e \frac{l_a}{A_a} H$$

$$B = B_0 + \mu_d H$$



- 1) Magnétisation
- 2) Système au repos
- 3) Ouverture entrefer
- 4) Fermeture entrefer
- 5) **Champ externe**

Droite de charge

$$B = -\Lambda_e \frac{l_a}{A_a} H$$

Droite de retour

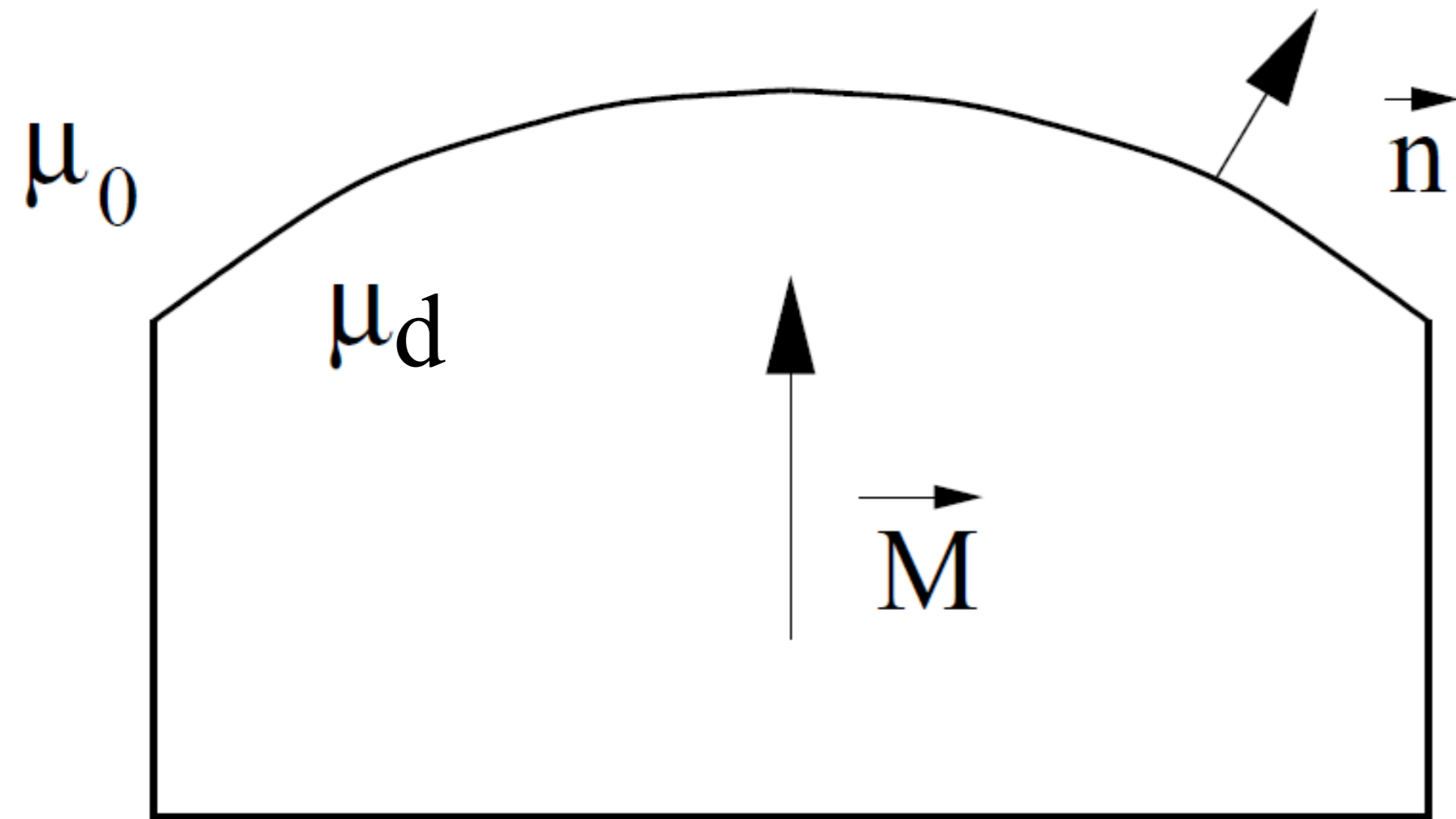
$$B = B_0 + \mu_d H$$

Point de fonctionnement

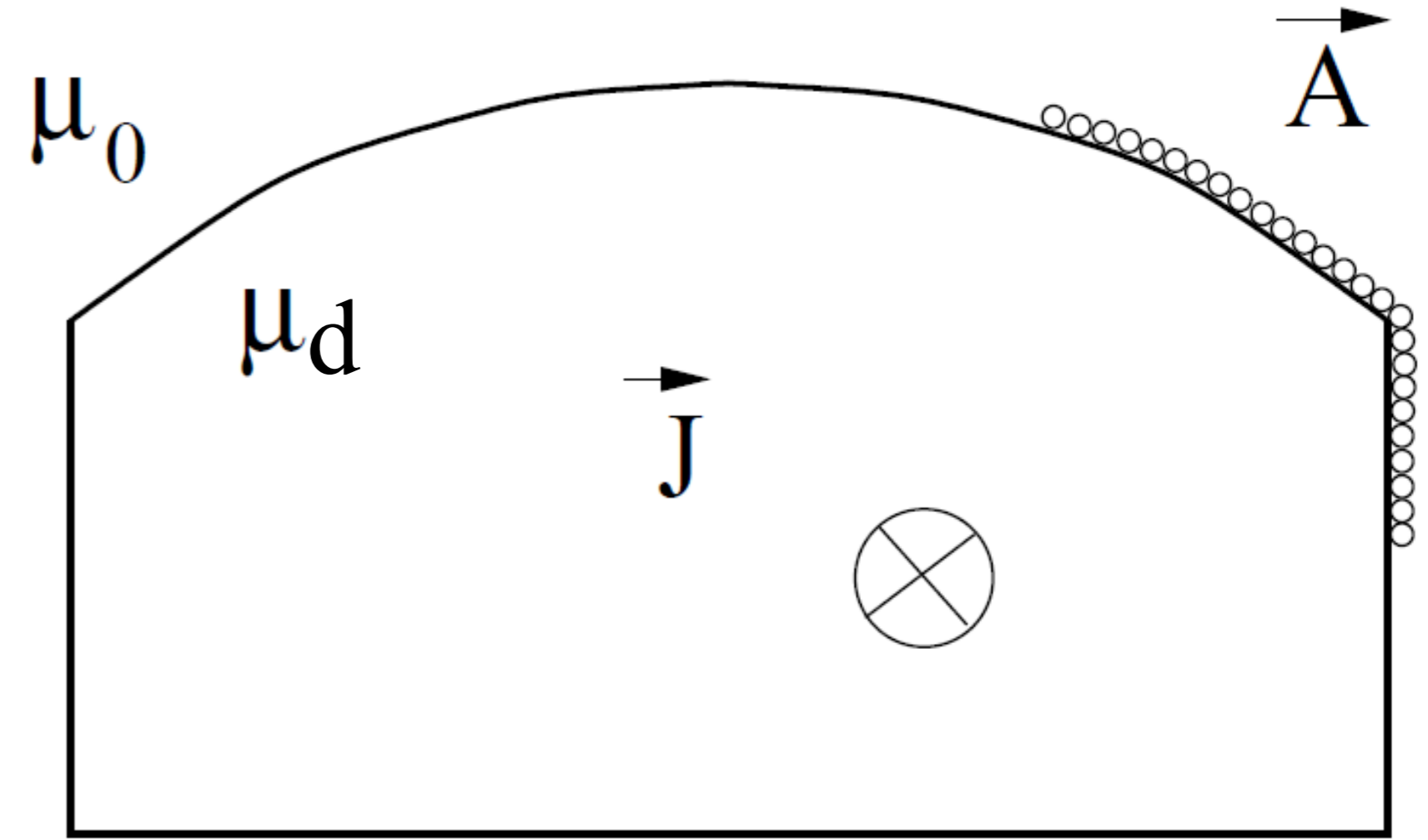
$$B = B_0 \frac{\Lambda_e}{\Lambda_e + \mu_d A_a / l_a}$$

$$H = -H_0 \frac{\mu_d A_a / l_a}{\Lambda_e + \mu_d A_a / l_a}$$

Courants équivalents

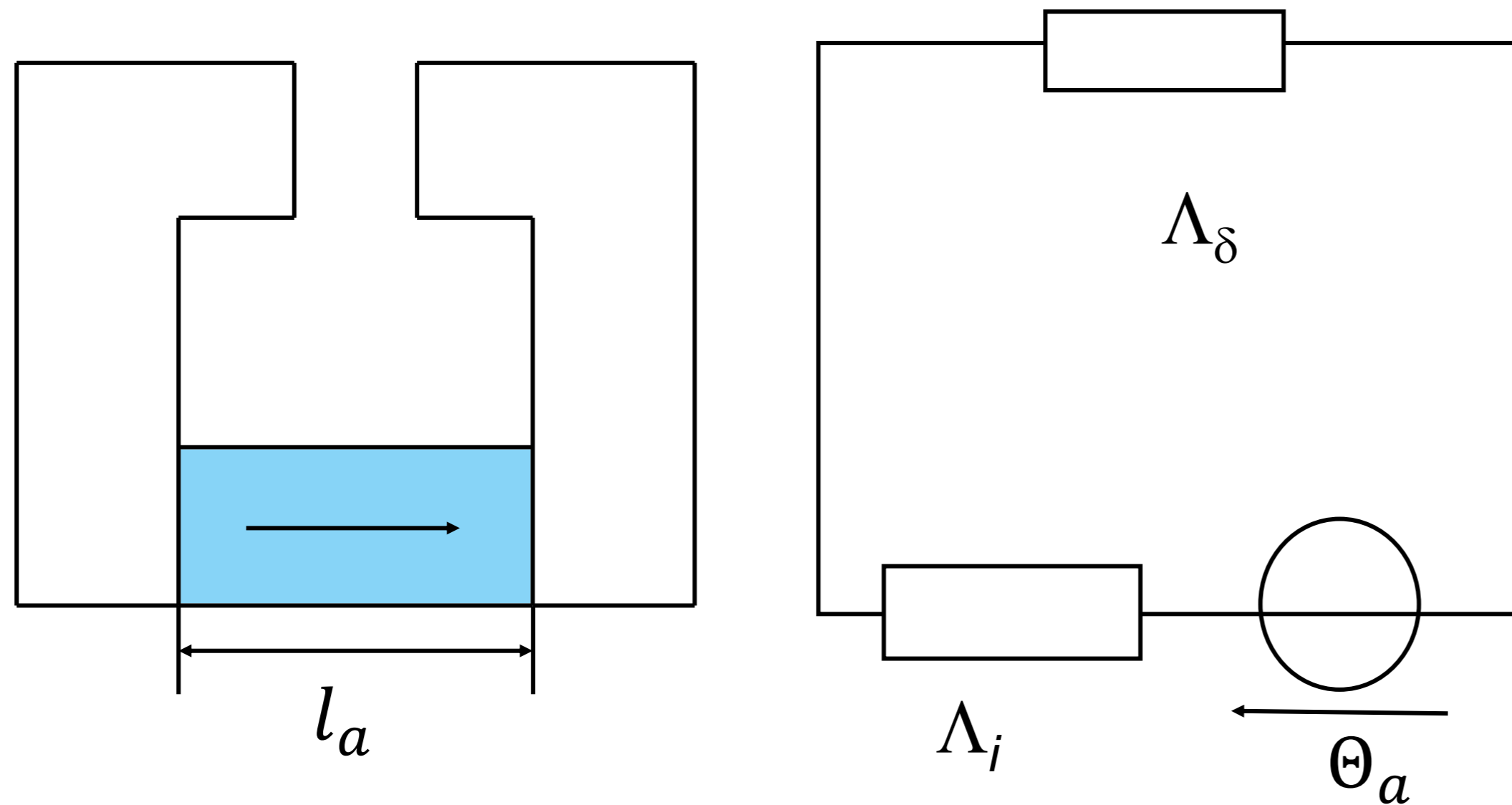


$$M = H_0 = \frac{B_0}{\mu_d}$$



$$\vec{A} = -\vec{n} \times \vec{M}$$
$$\vec{J} = \overrightarrow{rot} \vec{M}$$

Schéma équivalent



- Courants équivalents

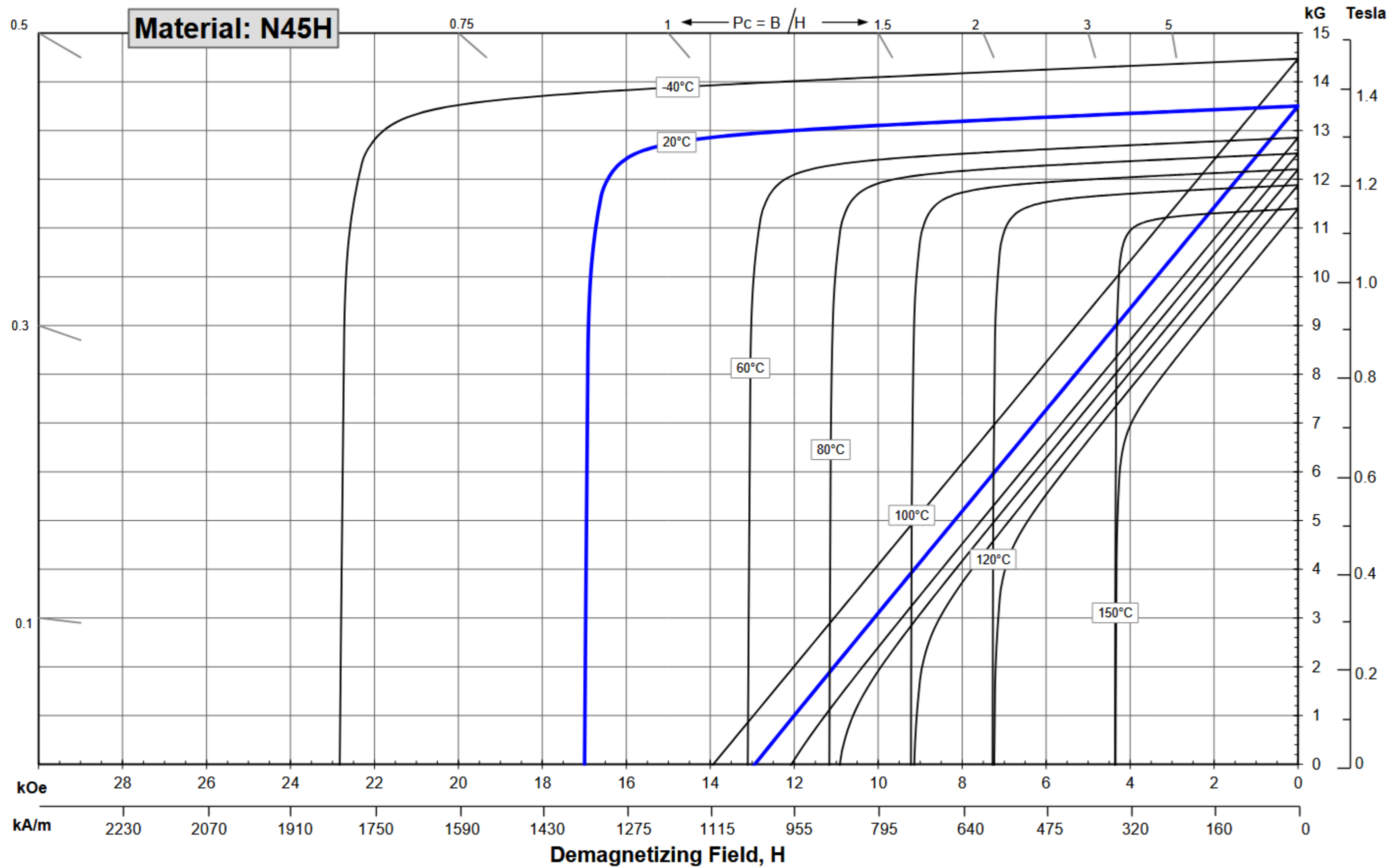
- Source idéale:

$$\Theta_a = H_0 l_a$$

- Perméance en série:

$$\Lambda_i = \frac{\mu_d A_a}{l_a}$$

Exemple



Magnetic Properties	Characteristic	Units	min.	nominal	max.
	Br , Residual Induction	Gauss		13,200	13,500
H_{cB} , Coercivity	Oersteds		12,200	12,700	13,200
	kA/m		971	1011	1050
H_{cJ} , Intrinsic Coercivity	Oersteds		17,000		
	kA/m		1,353		
BH_{max} , Maximum Energy Product	MGOe		42	45	47
	kJ/m ³		334	354	374

Thermal Properties	Characteristic	Units	C //	C ⊥
	Reversible Temperature Coefficients ⁽¹⁾	of Induction, α(Br)	%/°C	-0.12
of Coercivity, α(H _{cj})		%/°C	-0.57	
Coefficient of Thermal Expansion ⁽²⁾	ΔL/L per °C × 10 ⁻⁶		7	-1
Thermal Conductivity	kcal/mhr°C		5.3	5.8
Specific Heat ⁽³⁾	cal/g°C		0.11	
Curie Temperature, T _c	°C		310	
Other Properties	Flexural Strength	psi	41,300	
		MPa	285	
	Density	g/cm ³	7.6	
	Hardness, Vickers	Hv	620	
Electrical Resistivity, ρ	μΩ · cm		150 // 130 ⊥	

Notes:

- (1) Coefficients measured between 20 and 120 °C
- (2) Between 20 and 200 °C. Values are typical and can vary.
- (3) Between 20 and 140 °C