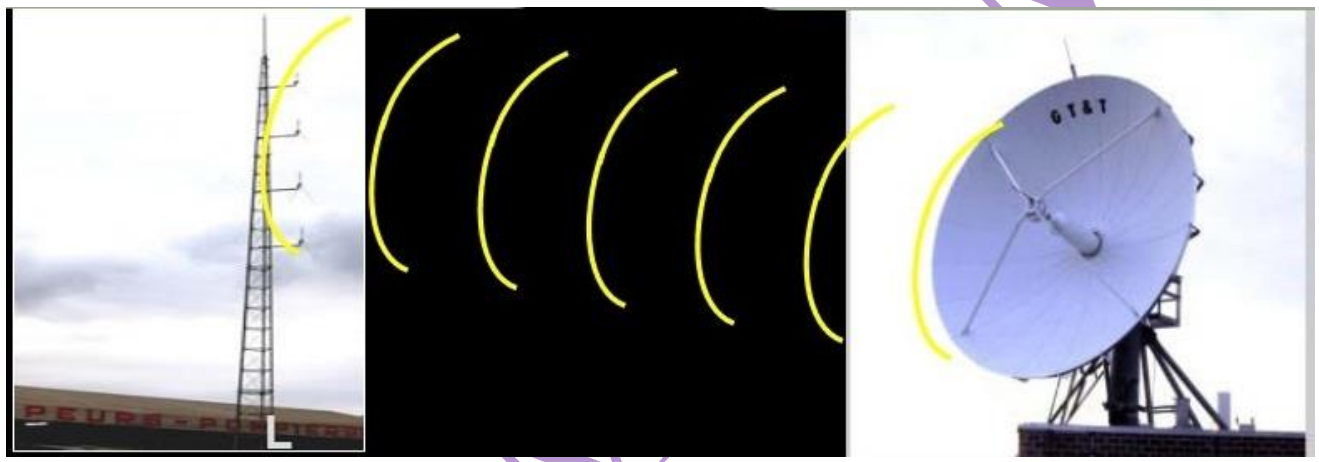
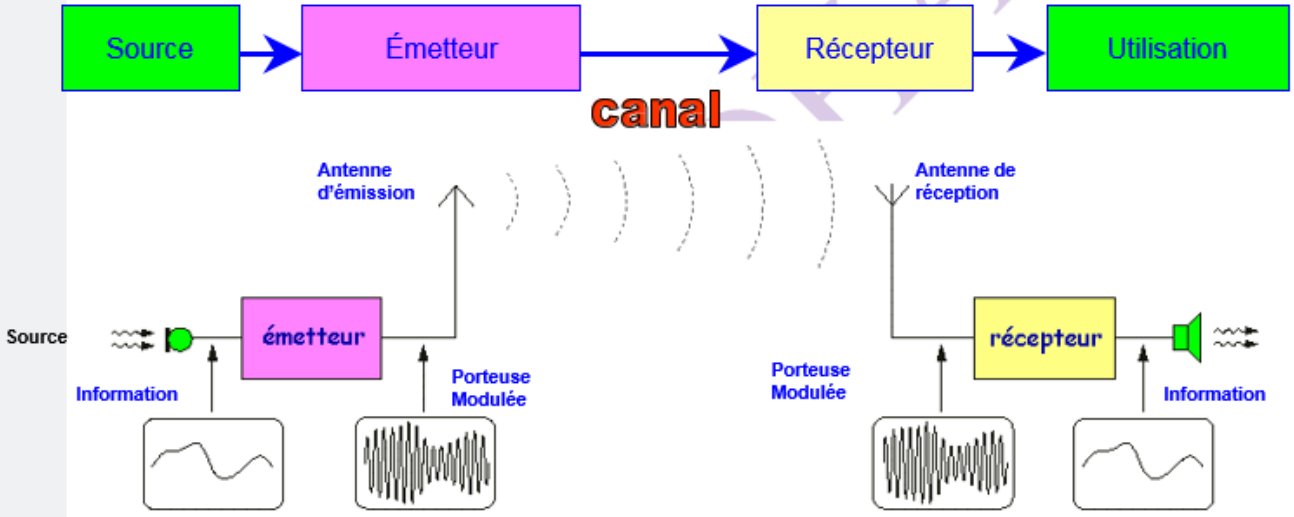
PHYSIQUE

Applications : Production d'ondes électromagnétiques et communication et Modulation d'amplitude

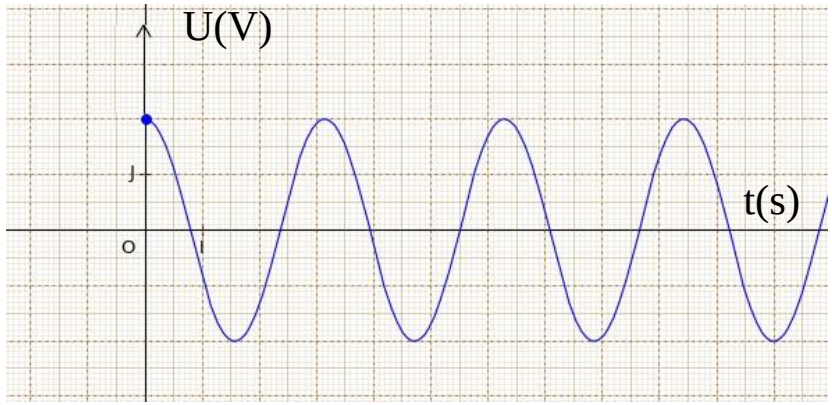




PHYSIQUE

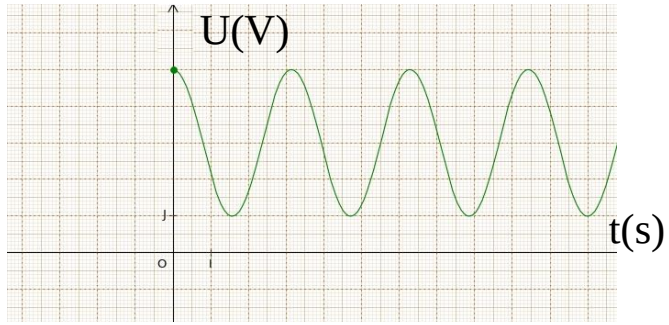
Le signal modulant : *signal à envoyer*

$$s(t) = s_m.\cos(2\pi f_s.t)$$



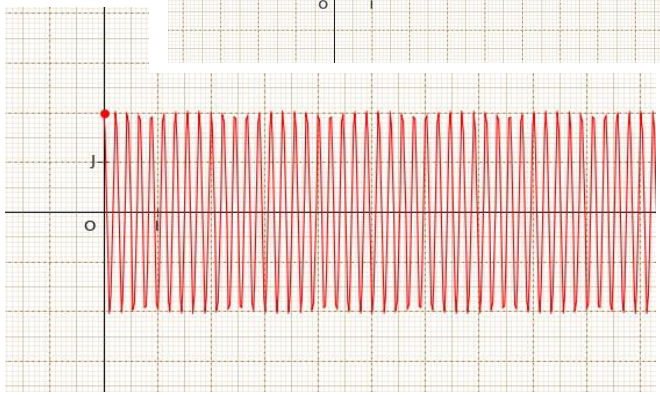
Le signal modulant + la tension de décalage :

$$S(t) = s(t) + U_0 = s_m.\cos(2\pi f_s.t) + U_0$$



La tension porteuse :

$$P(t) = P_m.\cos(2\pi F_P.t)$$

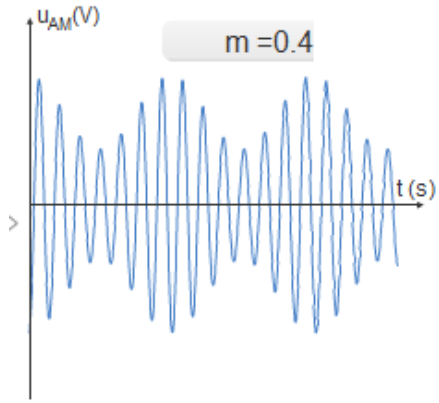


PHYSIQUE

La tension modulée :

$$U_s(t) = k \times S(t) \times P(t)$$

$$U_s(t) = k \times S(t) \times P_m.\cos(2\pi F_P.t)$$



$$U_s(t) = k \times \left[s_m.\cos(2\pi f_S.t) + U_0 \right] \times P_m.\cos(2\pi F_P.t)$$

$$U_s(t) = k \times P_m \times \left[s_m.\cos(2\pi f_S.t) + U_0 \right] \times \cos(2\pi F_P.t)$$

$$U_s(t) = k \times P_m \times U_0 \times \left[m.\cos(2\pi f_S.t) + 1 \right] \times \cos(2\pi F_P.t)$$

$$U_s(t) = A \times \left[m.\cos(2\pi f_S.t) + 1 \right] \times \cos(2\pi F_P.t)$$

$$U_S(t) = A \times \left[m.\cos(2\pi f_s.t) + 1 \right] \times \cos(2\pi F_P.t)$$

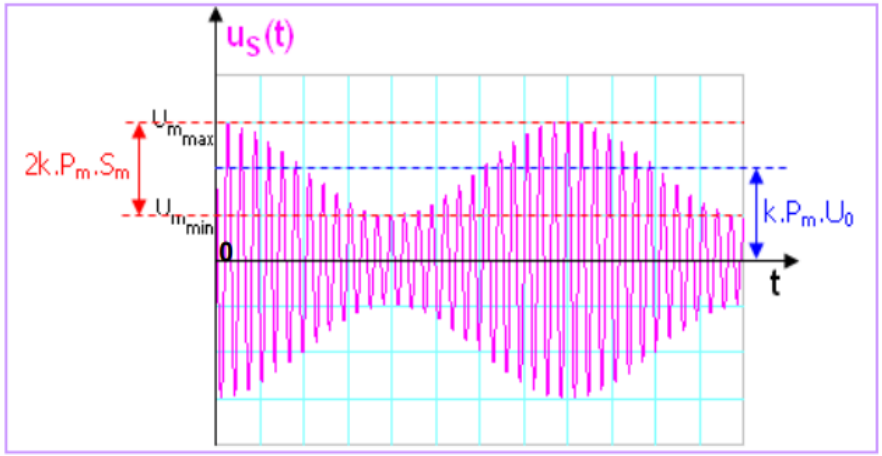
m : ***Le taux de modulation***

$$m = \frac{S_m}{U_0} \quad \text{et} \quad A = k \times P_m \times U_0$$

Les conditions d'une bonne modulation :

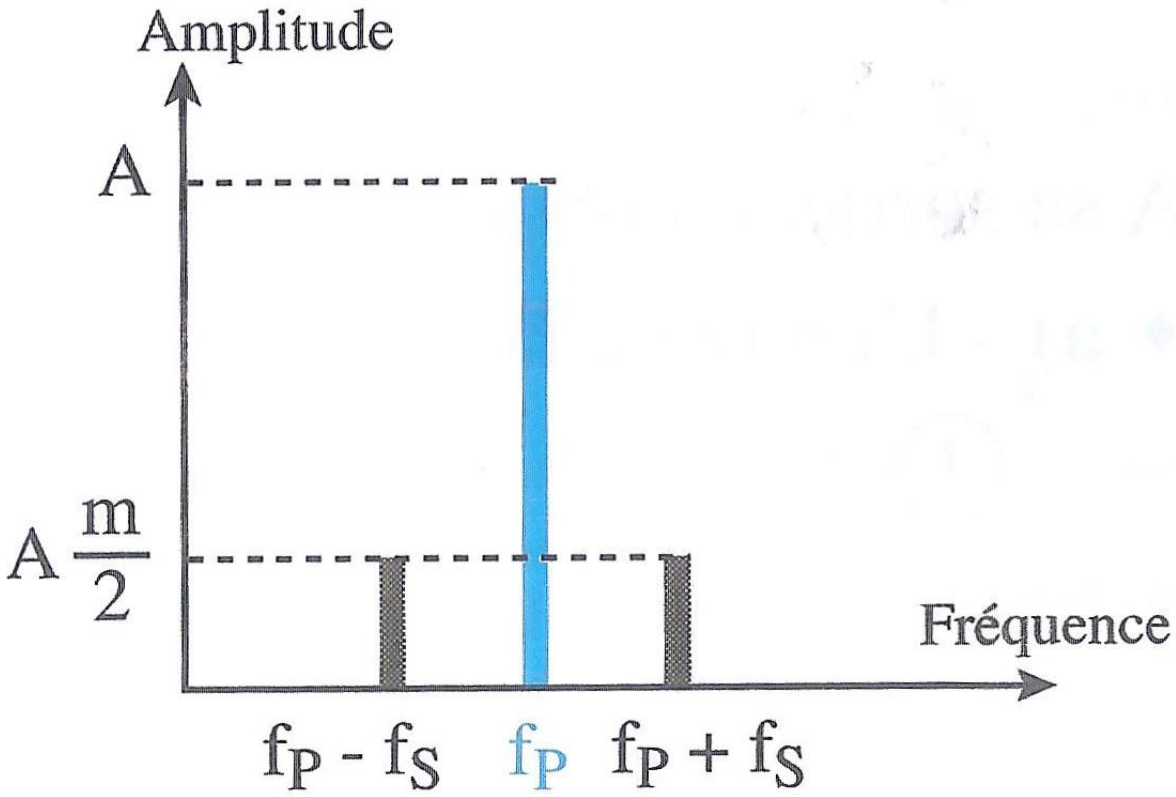
- $m < 1$ ou $\mathbf{U_0 > S_m}$
- **Fp >> fs** (au moins Fp > 10.fs).

$$m = \frac{U_m(max) - U_m(min)}{U_m(max) + U_m(min)}$$



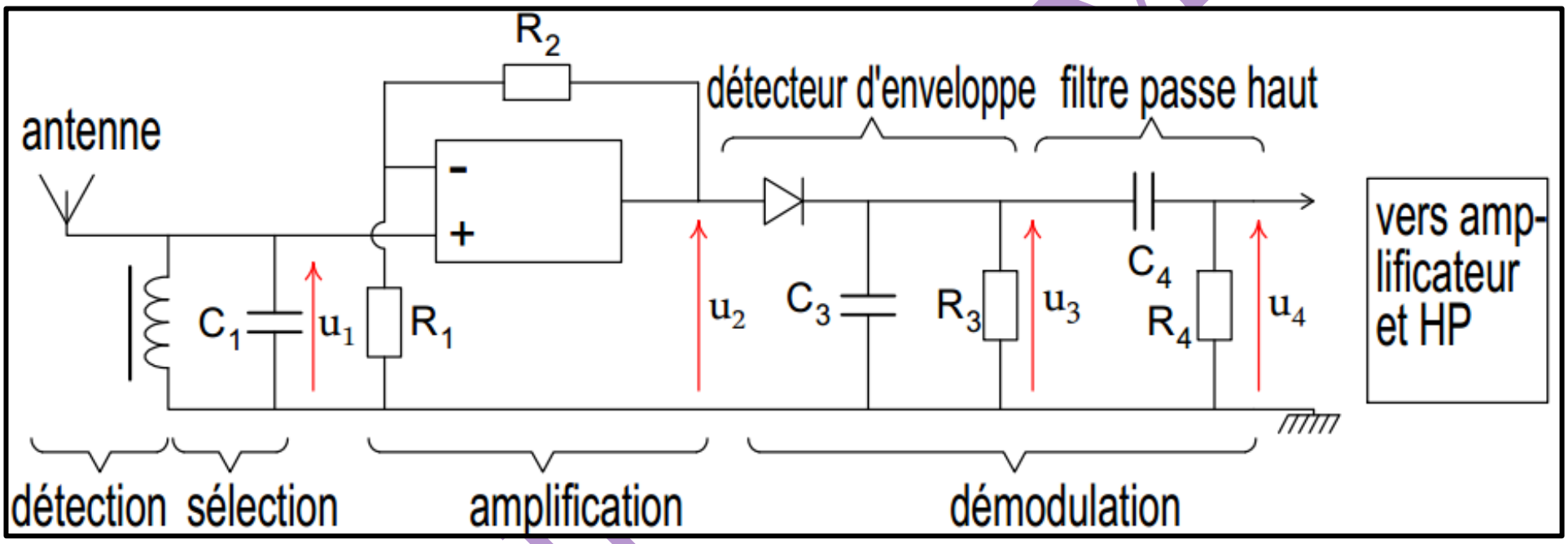
Spectre de fréquences de la tension modulée :

$$U_S(t) = \frac{A.m}{2}.\cos\left[2\pi(F_P + f_S).t\right] + A.\cos(2\pi F_P.t) + \frac{A.m}{2}.\cos\left[2\pi(F_P - f_S).t\right]$$



PHYSIQUE

La réception de la tension modulée



1) Phase de la sélection : *Filtre passe-bande*

$$T_0 = 2\pi\sqrt{L.C} = \frac{1}{f_0} \Rightarrow f_0 = F_P = \frac{1}{2\pi\sqrt{L.C}}$$

2) Démodulation :

Détecteur d'enveloppe : isoler Le signal modulant + la tension de décalage

- **Conditions de meilleure détection d'enveloppe**

$$T_P << \tau < T_S \quad \text{ou} \quad f_s < 1/\tau << F_P$$

&

$$Fp >> fs \ (\text{au moins } Fp > 10.fs).$$

Avec $\tau = RC$

- **Filtre passe haut : éliminer la tension de décalage**