

$$(10) y'' + 2y' + y = 3 \cos(2t) - 2 \sin(2t)$$

ROM:  $\Delta(x) = x^2 + 2x + 1 = (x+1)^2$  - (et racine double)

$$y_H = (Ax+B)e^{-x} \text{ où } A \text{ et } B \in \mathbb{R}$$

Sol part:  $y_p = a \cos(2t) + b \sin(2t)$        $y_p' = -2a \sin(2t) + 2b \cos(2t)$

$$y_p'' = -4a \cos(2t) - 4b \sin(2t)$$

$$y_p'' + 2y_p' + y_p = -4a \cos(2t) - 4b \sin(2t) - 4a \sin(2t) + 4b \cos(2t) + a \cos(2t) + b \sin(2t)$$

$$= (4b - 3a) \cos(2t) + (-3b - 4a) \sin(2t) = 3 \cos(2t) - 2 \sin(2t)$$

$$\Rightarrow \begin{cases} 4b - 3a = 3 & \times 3 \\ 3b + 4a = 2 & \times 4 \end{cases} \Rightarrow \begin{cases} 12b - 9a = 9 \\ 12b + 16a = 8 \end{cases}$$

$$l_2 - l_1: 25a = 8 - 9 = -1 \Rightarrow a = -\frac{1}{25} \Rightarrow 3b = 2 - 3a = 2 - 12 = -10$$

$$\Rightarrow 3b = -10 \Rightarrow b = -\frac{10}{3}$$

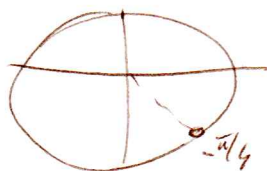
$$y_p = 3 \cos(2t) + 3 \sin(2t)$$

$$= A \cos(\omega t + \varphi) \quad \text{ici } \omega = 2$$

$$= A \cos(\varphi) \cos(2t) - A \sin(\varphi) \sin(2t)$$

$$\begin{cases} A \cos(\varphi) = 3 \\ -A \sin(\varphi) = 3 \end{cases} \Rightarrow A^2 \cos^2(\varphi) + A^2 \sin^2(\varphi) = 9 + 9 = 18 = 2 \cdot 9 \Rightarrow A = 3\sqrt{2}$$

$$\Rightarrow \cos(\varphi) = \frac{3}{3\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad \text{et} \quad \sin(\varphi) = \frac{-3}{3\sqrt{2}} = -\frac{\sqrt{2}}{2}$$



$$\varphi = -\frac{\pi}{4}$$

$$y_p = 3\sqrt{2} \cos\left(2t - \frac{\pi}{4}\right)$$

$$\text{Sol de l'eq complete: } y = (Ax+B)e^{-x} + 3\sqrt{2} \cos\left(2t - \frac{\pi}{4}\right)$$