(14.13). α = inconnue, < 0 · $0{,}3 \frac{\text{tours}}{\text{sec}} = 0{,}3 \cdot 2\pi \frac{\text{rad}}{s} = 0{,}6\pi \frac{\text{rad}}{s}$ · 7 tours = 14π radians

ω_i : vitesse initiale

- $\omega_f = \alpha \Delta t + \omega_i$

$0{,}6\pi = \alpha \cdot 10 + \omega_i \quad \Rightarrow \omega_i = 0{,}6\pi - 10\alpha$

- $\Delta\theta = \frac{1}{2}\alpha \Delta t^2 + \omega_i \Delta t$

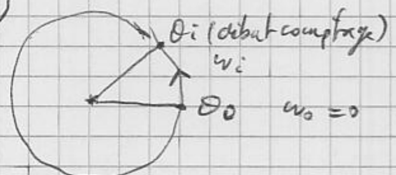
$14\pi = \frac{1}{2}\alpha\, 100 + \omega_i \cdot 10 \quad = \frac{1}{2}\alpha\, 100 + 6\pi - 100\alpha$

$\Rightarrow 8\pi = -50\alpha$

$\Rightarrow \alpha = -\frac{8\pi}{50} \frac{\text{rad}}{s^2} = -\frac{4}{50} \cdot 2\pi \frac{\text{rad}}{s^2} = -\frac{4}{50} \frac{\text{tour}}{s^2} = \underline{\underline{-8 \cdot 10^{-2} \frac{\text{tours}}{s^2}}}$

1 tour $\equiv 2\pi$ rad

(14.14)



$\alpha = 2 \frac{\text{rad}}{s^2}$ = constante $\quad \Delta\theta = 285$ rad

Δt_0 = temps recherché

$\Delta t = 11\, s$

i). mouvement initial entre 0 et i

$\omega_i = \alpha \Delta t_0 = 2\Delta t_0$

ii). à partir du comptage

$\Delta\theta = \theta_f - \theta_i = \frac{1}{2}\alpha(\Delta t)^2 + \omega_i \Delta t = \frac{1}{2} \cdot 2 \cdot 121 + 2\Delta t_0 \cdot 11 = 285$

$\Rightarrow \Delta t_0 = \frac{285 - 121}{2 \cdot 11} \cong \underline{\underline{7{,}5\, s}}$

(14.15).

- Phase I, accélération initiale

$\Delta\theta = \frac{1}{2}\alpha \Delta t^2 = \frac{1}{2} \cdot 3{,}5 \cdot 10^{-3} \cdot (30 \cdot 60)^2 = 5670 \text{ rad} \quad (1) \quad ; \omega_f = \alpha \Delta t = 3{,}5 \cdot 10^{-3} \cdot 1800 = 6{,}3 \frac{\text{rad}}{s}$

- Phase II, vitesse constante

$\Delta\theta = \omega \Delta t = 6{,}3 \cdot 60 \cdot 60 = 22'680 \text{ rad} \quad (2)$

- Phase III, décélération finale

$\omega_f = \alpha \Delta t + \omega_i$

$\omega_f = -2 \cdot 10^{-3} \Delta t + \omega_i$

$5 = -2 \cdot 10^{-3} \Delta t + 6{,}3$

$\Rightarrow \Delta t = \frac{-1{,}3}{-2 \cdot 10^{-3}}$

$\Delta\theta = \frac{1}{2}\alpha(\Delta t)^2 + \omega_i \Delta t$

$\Delta\theta = \frac{1}{2} \cdot (-2 \cdot 10^{-3}) \cdot \Delta t^2 + 6{,}3 \cdot \Delta t = 3672{,}5 \text{ rad} \quad (3)$

$\Rightarrow$ distance totale $= (1) + (2) + (3) = 32'022{,}5 \text{ rad} \overset{\div 2\pi}{\cong} \underline{\underline{5100 \text{ tours}}}$