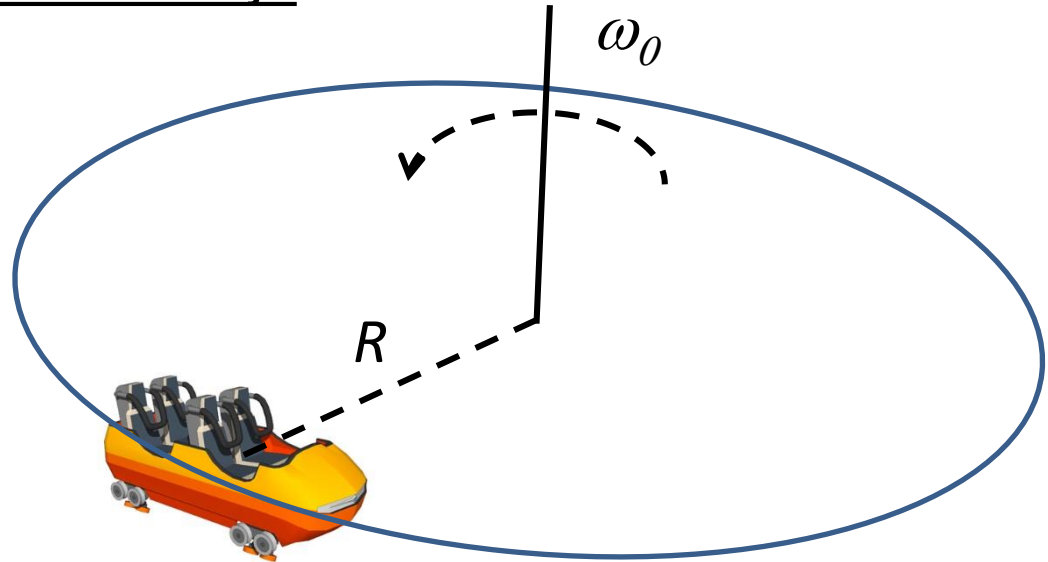
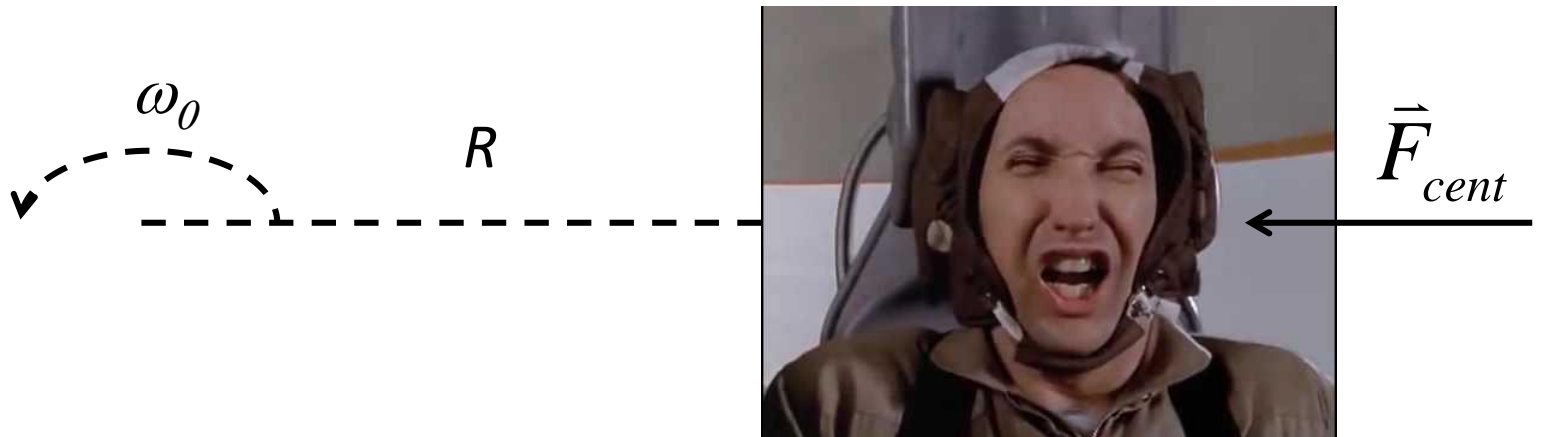


Enakomerno pospešeno kroženje



$$\ddot{\vec{r}} = -R(\omega_0 + \alpha t)^2 \hat{e}_r + R\alpha \hat{e}_\varphi$$

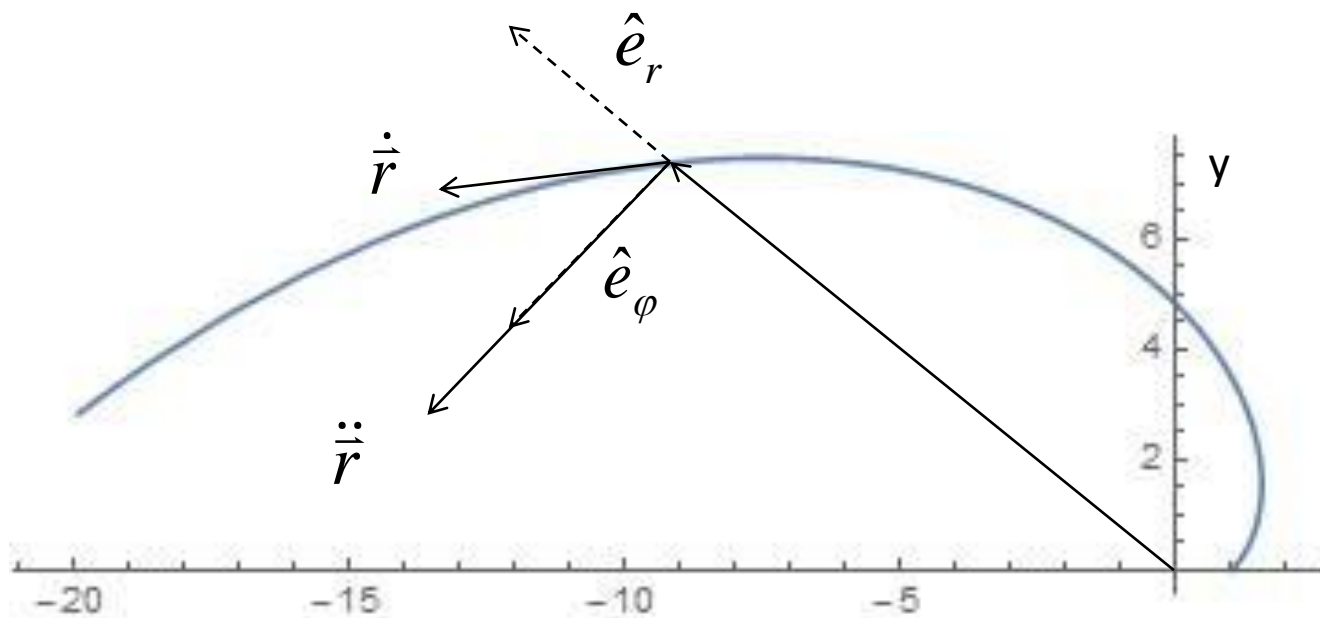


Gibanje po spirali

$$r = r_0 e^{\beta t}$$

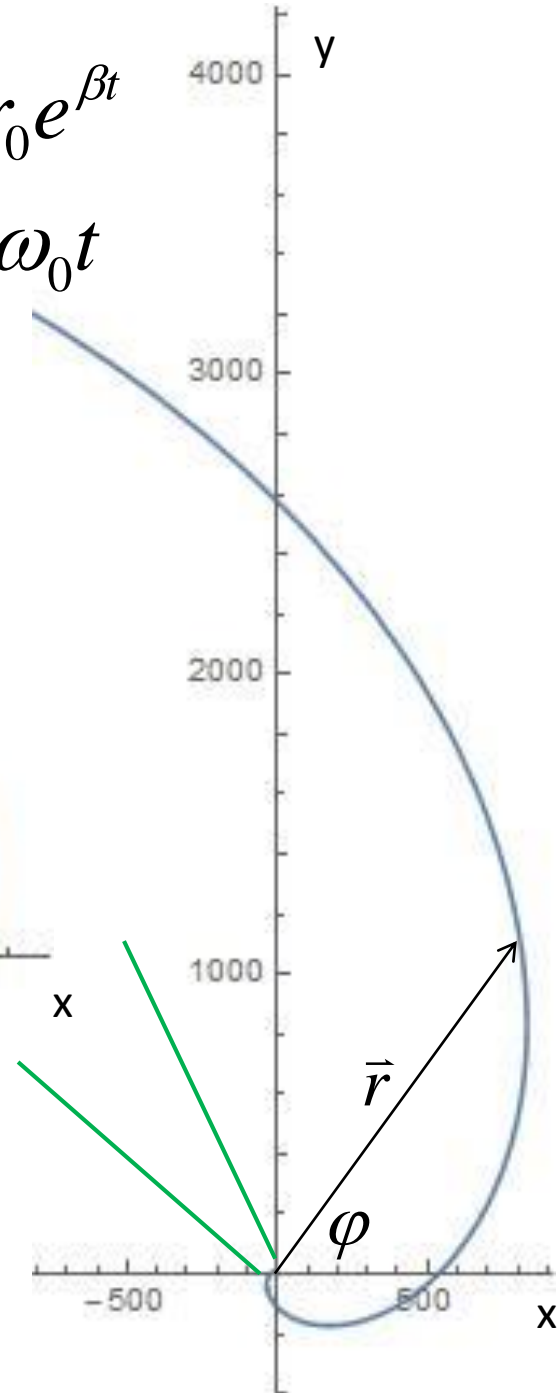
$$\varphi = \omega_0 t$$

$$\dot{\vec{r}} = r_0 \beta e^{\beta t} \hat{e}_r + r_0 \omega_0 e^{\beta t} \hat{e}_\varphi$$



$$\ddot{\vec{r}} = r_0 e^{\beta t} (\beta^2 - \omega_0^2) \hat{e}_r + 2r_0 \beta \omega_0 e^{\beta t} \hat{e}_\varphi$$

$$\ddot{\vec{r}} \equiv \underbrace{2r_0 \omega_0^2 e^{\omega_0 t} \hat{e}_\varphi}_{\beta^2 = \omega_0^2}$$



$$\ddot{\vec{r}} \cdot \dot{\vec{r}} = |\ddot{\vec{r}}| |\dot{\vec{r}}| \cos \theta = 2r_0^2 \omega_0^3 e^{2\omega_0 t}$$

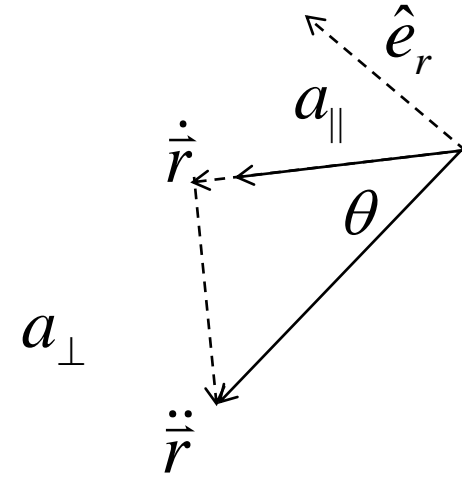
$$|\dot{\vec{r}}| = \sqrt{2} r_0 \omega_0 e^{\omega_0 t}$$

$$|\ddot{\vec{r}}| = 2r_0 \omega_0^2 e^{\omega_0 t}$$

$$\cos \theta = \frac{2r_0^2 \omega_0^3 e^{2\omega_0 t}}{2\sqrt{2} r_0^2 \omega_0^3 e^{2\omega_0 t}} = \frac{1}{\sqrt{2}}$$

$$a_{\perp} = |\ddot{\vec{r}}| \sin \theta = \sqrt{2} r_0 \omega_0^2 e^{\omega_0 t}$$

$$a_{\parallel} = |\ddot{\vec{r}}| \cos \theta = \sqrt{2} r_0 \omega_0^2 e^{\omega_0 t}$$



$$\dot{\vec{r}} \equiv \underbrace{r_0 \omega_0 e^{\omega_0 t}}_{\beta^2 = \omega_0^2} \hat{e}_r + r_0 \omega_0 e^{\omega_0 t} \hat{e}_{\varphi}$$

$$\ddot{\vec{r}} \equiv \underbrace{2r_0 \omega_0^2 e^{\omega_0 t}}_{\beta^2 = \omega_0^2} \hat{e}_{\varphi}$$

$$\hat{e}_{\varphi} \perp \hat{e}_r \Rightarrow \hat{e}_{\varphi} \cdot \hat{e}_r = 0$$

$$\hat{e}_{\varphi} \cdot \hat{e}_{\varphi} = |\hat{e}_{\varphi}|^2 = 1$$