ملخص ديناميكا

Self_Coordinates

« الاحداثيات الذاتية »

زاوية

$S = S(\psi)$ Trajectory معادلة المسار

$V = \dot{S}\,\underline{i}$!! $\underline{i}$ ← متجه وليس احداثي

$d\underline{i} = \psi\,\underline{j}$ $F = \ddot{S}\,\underline{i} + \dot{S}\dot{\psi}\,\underline{j} = \ddot{S}\,\underline{i} + \dot{S}\dfrac{d\underline{i}}{dt}$

$\Rightarrow \dot{S}\dot{\psi} = \dfrac{dS}{dt} \cdot \dfrac{d\psi}{dS} \cdot \dfrac{dS}{dt} = \dfrac{V^2}{\rho}$

$\boxed{\dfrac{dS}{d\psi} = \rho}$ ⇒ Radis المنحنى

$F = \ddot{S}\,\underline{i} + \dfrac{V^2}{\rho}\,\underline{j}$ ⇒ $\boxed{F = V\dfrac{dV}{dr} = V\dfrac{dV}{dS}}$

$F = V\dfrac{dV}{dS}\,\underline{i} + \dfrac{V^2}{\rho}\,\underline{j}$

EX] Prove that the angular acceleration can be determined by the follow: $\frac{v}{\rho}\cdot\frac{dv}{ds}-\frac{v^2}{\rho^2}\frac{d\rho}{ds}$

« Solu »

Angular acceleration is($\ddot{\psi}$) العجلة الزاوية

$$\dot{\psi}=\frac{d\psi}{dt}=\frac{d\psi}{ds}\cdot\frac{ds}{dt}$$

$$\ddot{\psi}=\frac{d}{ds}\left(\frac{v}{\rho}\right)\frac{ds}{dt}=\frac{\frac{v\,dv}{ds}\rho-\frac{d\rho}{ds}v^2}{\rho^2}$$

$$=\frac{v\,dv}{ds}\rho-\frac{d\rho}{ds}\frac{v^2}{\rho^2}\quad\#$$