

USEFUL FORMULAS

$n - t$ coordinates: $\vec{v} = v\vec{e}_t$ where $v = \dot{s} = \rho\dot{\beta}$

$$\vec{a} = a_n\vec{e}_n + a_t\vec{e}_t \quad \text{where } a_n = \frac{v^2}{\rho} = \rho\dot{\beta}^2, a_t = \dot{v} \quad (vdv = a_t ds)$$

Polar coordinates: $\vec{v} = v_r\vec{e}_r + v_\theta\vec{e}_\theta$ where $v_r = \dot{r}$, $v_\theta = r\dot{\theta}$

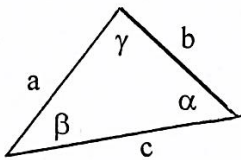
$$\vec{a} = a_r\vec{e}_r + a_\theta\vec{e}_\theta \quad \text{where } a_r = \ddot{r} - r\dot{\theta}^2, a_\theta = 2\dot{r}\dot{\theta} + r\ddot{\theta}$$

$$U'_{1-2} = \Delta T + \Delta V_g + \Delta V_e$$

$$\int_{t_1}^{t_2} \sum \vec{F} dt = \Delta \vec{G} \quad \int_{t_1}^{t_2} \sum \vec{M}_o dt = \Delta \vec{H}_o$$

Relative Motion : $\vec{v}_A = \vec{v}_B + \vec{\omega} \times \vec{r} + \vec{v}_{rel}$

$$\vec{a}_A = \vec{a}_B + \vec{\alpha} \times \vec{r} + \vec{\omega} \times (\vec{\omega} \times \vec{r}) + 2\vec{\omega} \times \vec{v}_{rel} + \vec{a}_{rel}$$



$$\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma}, \quad c^2 = a^2 + b^2 - 2ab \cos \gamma$$