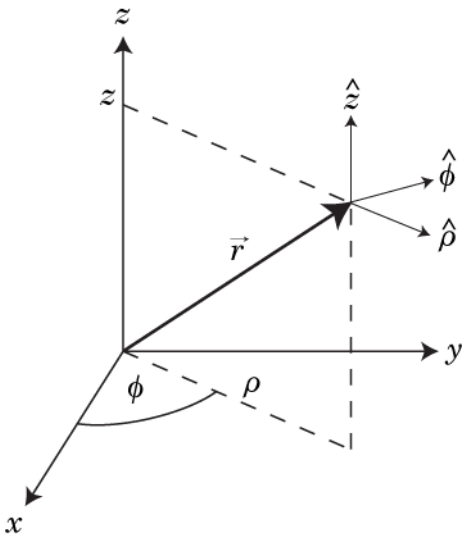
Coordenadas Cilíndricas

$$\vec{r} = \rho\hat{\rho} + z\hat{z}$$

$$\vec{v} = \dot{\rho}\hat{\rho} + \rho\dot{\phi}\hat{\phi} + \dot{z}\hat{z}$$

$$\vec{a} = \left(\ddot{\rho} - \rho\dot{\phi}^2\right)\hat{\rho} + \left(2\dot{\rho}\dot{\phi} + \rho\ddot{\phi}\right)\hat{\phi} + \ddot{z}\hat{z}$$

$$\frac{d\hat{\rho}}{dt} = \dot{\phi}\hat{\phi}, \qquad \frac{d\hat{\phi}}{dt} = -\dot{\phi}\hat{\rho}$$



Coordenadas Esféricas

$$\vec{r} = r\hat{r}$$

$$\vec{v} = \dot{r}\hat{r} + r\dot{\theta}\hat{\theta} + r\dot{\phi}\sin(\theta)\hat{\phi}$$

$$\vec{a} = \left(\ddot{r} - r\dot{\phi}^2\sin^2(\theta) - r\dot{\theta}^2\right)\hat{r}$$

$$+\left(r\ddot{\theta} - r\dot{\phi}^2\sin(\theta)\cos(\theta) + 2\dot{r}\dot{\theta}\right)\hat{\theta}$$

$$+\left(2\dot{r}\dot{\phi}\sin(\theta) + r\ddot{\phi}\sin(\theta) + 2r\dot{\theta}\dot{\phi}\cos(\theta)\right)\hat{\phi}$$

$$\frac{d\hat{r}}{dt} = \dot{\theta}\hat{\theta} + \dot{\phi}\sin(\theta)\,\hat{\phi}$$

$$\frac{d\hat{\theta}}{dt} = -\dot{\theta}\hat{r} + \dot{\phi}\cos(\theta)\,\hat{\phi}$$

$$\frac{d\hat{\phi}}{dt} = -\dot{\phi}\sin(\theta) - \dot{\phi}\cos(\theta)\,\hat{\theta}$$