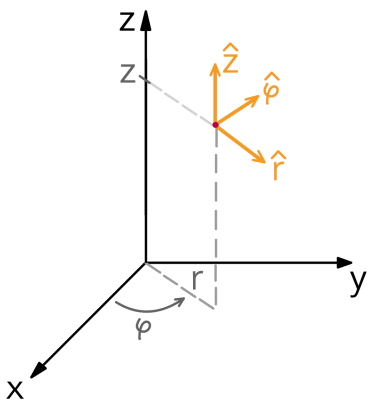
1 Coordenadas cilíndricas



Transformación de coordenadas

$$r = \sqrt{x^2 + y^2}$$
$$\tan(\varphi) = \frac{y}{x}$$
$$z = z$$

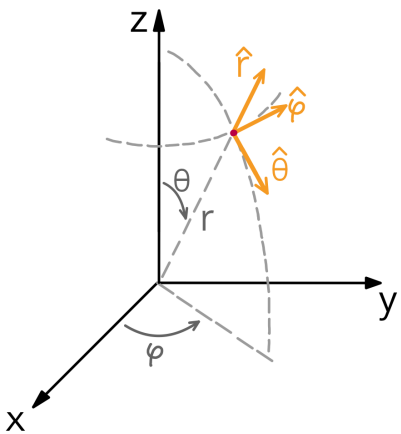
$$x = r\,\cos(\varphi)$$
$$y = r\,\sin(\varphi)$$
$$z = z$$

Relación entre versores

$$\hat{r} = \cos(\varphi)\,\hat{x} + \sin(\varphi)\,\hat{y}$$
$$\hat{\varphi} = -\sin(\varphi)\,\hat{x} + \cos(\varphi)\,\hat{y}$$
$$\hat{z} = \hat{z}$$

$$\hat{x} = \cos(\varphi)\,\hat{r} - \sin(\varphi)\,\hat{\varphi}$$
$$\hat{y} = \sin(\varphi)\,\hat{r} + \cos(\varphi)\,\hat{\varphi}$$
$$\hat{z} = \hat{z}$$

2 Coordenadas esféricas



Transformación de coordenadas

$$r = \sqrt{x^2 + y^2 + z^2}$$
$$\tan(\theta) = \frac{\sqrt{x^2 + y^2}}{z}$$
$$\tan(\varphi) = \frac{y}{x}$$

$$x = r\,\cos(\varphi)\sin(\theta)$$
$$y = r\,\sin(\varphi)\sin(\theta)$$
$$z = r\,\cos(\theta)$$

Relación entre versores

$$\hat{r} = \cos(\varphi)\sin(\theta)\,\hat{x} + \sin(\varphi)\sin(\theta)\,\hat{y} + \cos(\theta)\,\hat{z}$$
$$\hat{\theta} = \cos(\varphi)\cos(\theta)\,\hat{x} + \sin(\varphi)\cos(\theta)\,\hat{y} - \sin(\theta)\,\hat{z}$$
$$\hat{\varphi} = -\sin(\varphi)\,\hat{x} + \cos(\varphi)\,\hat{y}$$

$$\hat{x} = \sin(\theta)\cos(\varphi)\,\hat{r} + \cos(\theta)\cos(\varphi)\,\hat{\theta} - \sin(\varphi)\,\hat{\varphi}$$
$$\hat{y} = \sin(\theta)\cos(\varphi)\,\hat{r} + \cos(\theta)\cos(\varphi)\,\hat{\theta} + \cos(\varphi)\,\hat{\varphi}$$
$$\hat{z} = \cos(\theta)\,\hat{r} - \sin(\theta)\,\hat{\theta}$$