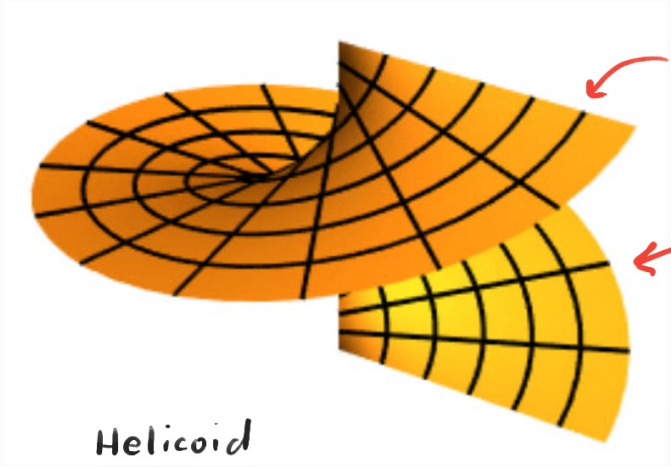


**Helicoid**

$$\vec{x} = r\hat{r} + b\theta\hat{z}$$
$$\vec{e}_1 = \frac{\partial \vec{x}}{\partial r}, \quad \vec{e}_2 = \frac{\partial \vec{x}}{\partial \theta}$$

**Helix**

$$\vec{\alpha} = a\hat{r} + b\theta\hat{z}$$
$$\Rightarrow \hat{\tau} = \frac{\vec{e}_2}{|\vec{e}_2|}$$

Recall: $\hat{N} = -\hat{r}$
$= -\vec{e}_1$

$\therefore \hat{B} = \hat{\tau} \times \hat{N} = \hat{n}$

$\therefore S(\hat{\tau}) = -\nabla_{\hat{\tau}} \hat{B} = \tau \hat{N} = -\tau \hat{r}$

$\Rightarrow k(\hat{\tau}) \sim S(\hat{\tau}) \cdot \hat{\tau} = 0$