Eletromagnetismo

21 de março

Análise vetorial

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Teoremas fundamentais

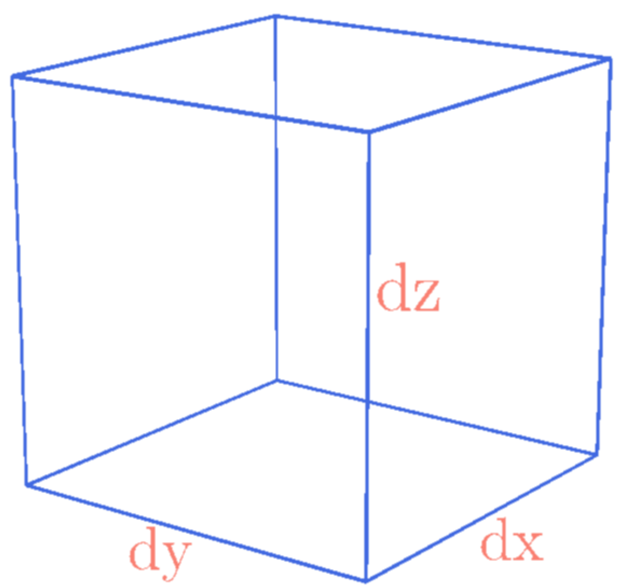
$$\int_{\mathcal{C}} \vec{\boldsymbol{\nabla}} T \cdot \mathrm{d}\vec{\ell} = T_b - T_a$$

$$\int_{\mathcal{S}} \vec{\boldsymbol{\nabla}} \times \vec{\mathbf{v}} \cdot \hat{n}\ \mathrm{d}A = \oint \vec{\mathbf{v}} \cdot \mathrm{d}\vec{\ell}$$

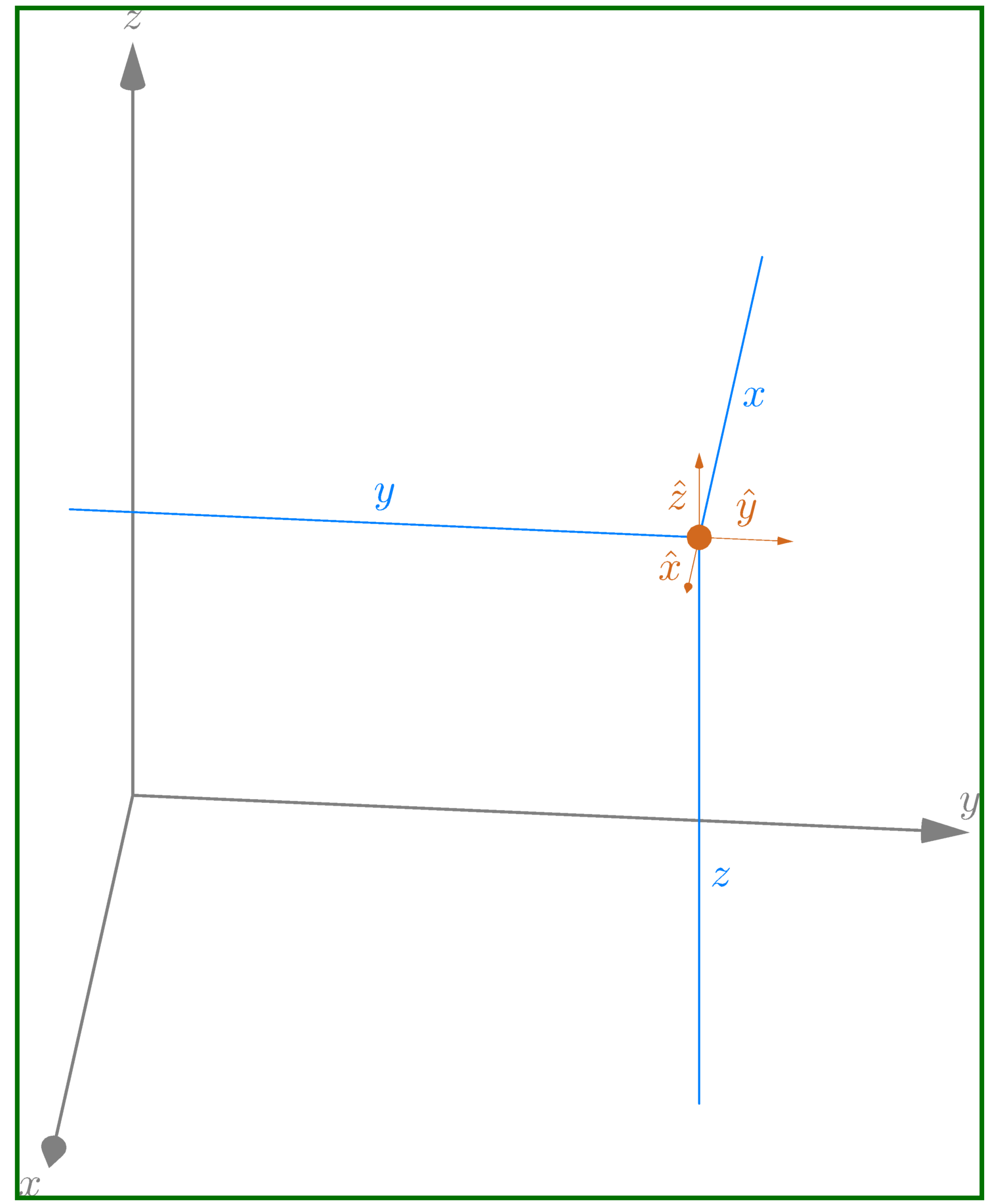
$$\int_{\mathcal{V}} \vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{v}}\ \mathrm{d}\tau = \int \vec{\mathbf{v}} \cdot \hat{n}\ \mathrm{d}A$$

Análise vetorial

Coordenadas cartesianas



$$\mathrm{d}\vec{\ell} = \mathrm{d}x\,\hat{x} + \mathrm{d}y\,\hat{y} + \mathrm{d}z\,\hat{z}$$



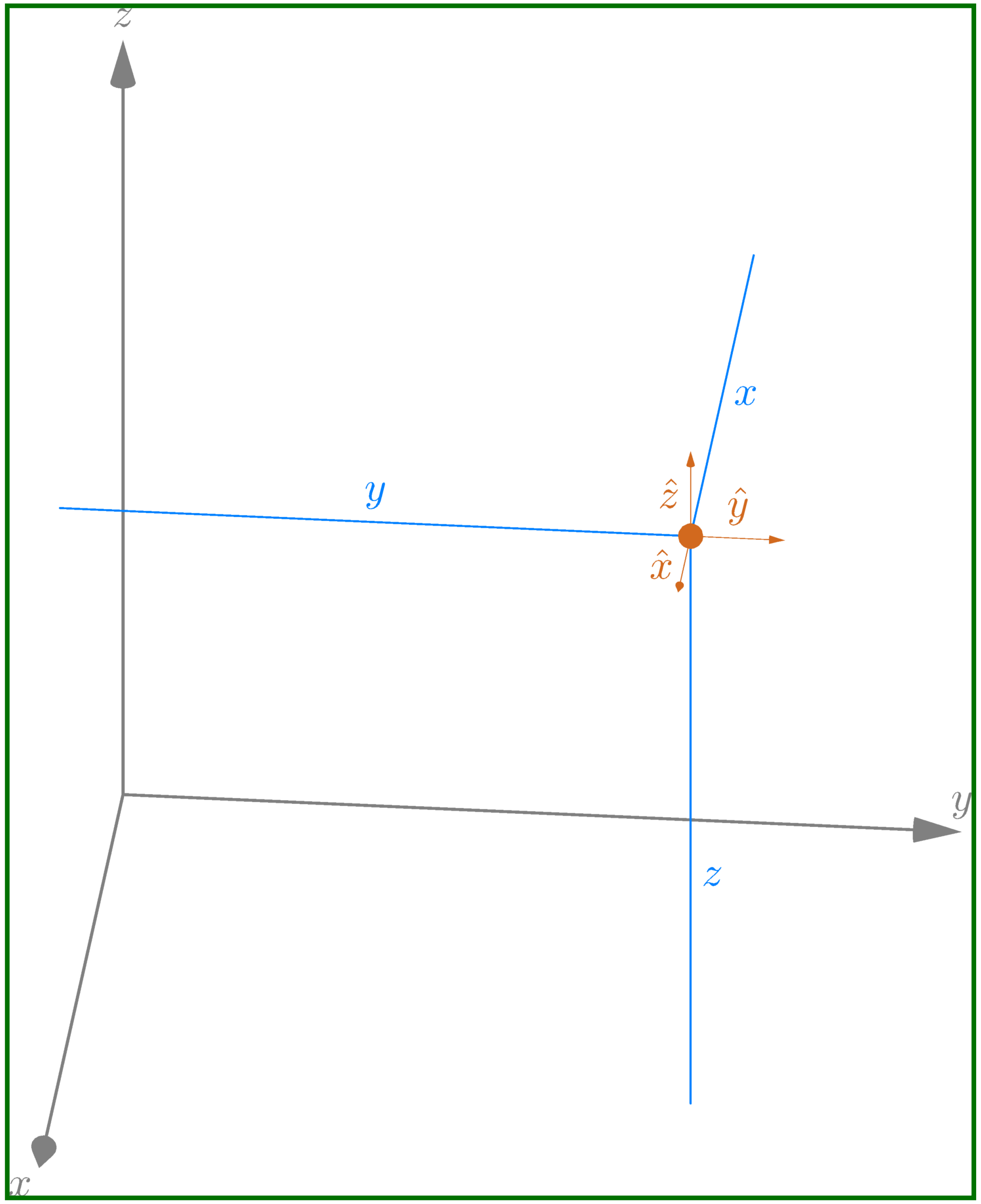
Análise vetorial

Coordenadas cartesianas

$$\int_{\mathcal{C}} \vec{\boldsymbol{\nabla}} T \cdot \mathrm{d}\vec{\ell} = T_b - T_a$$

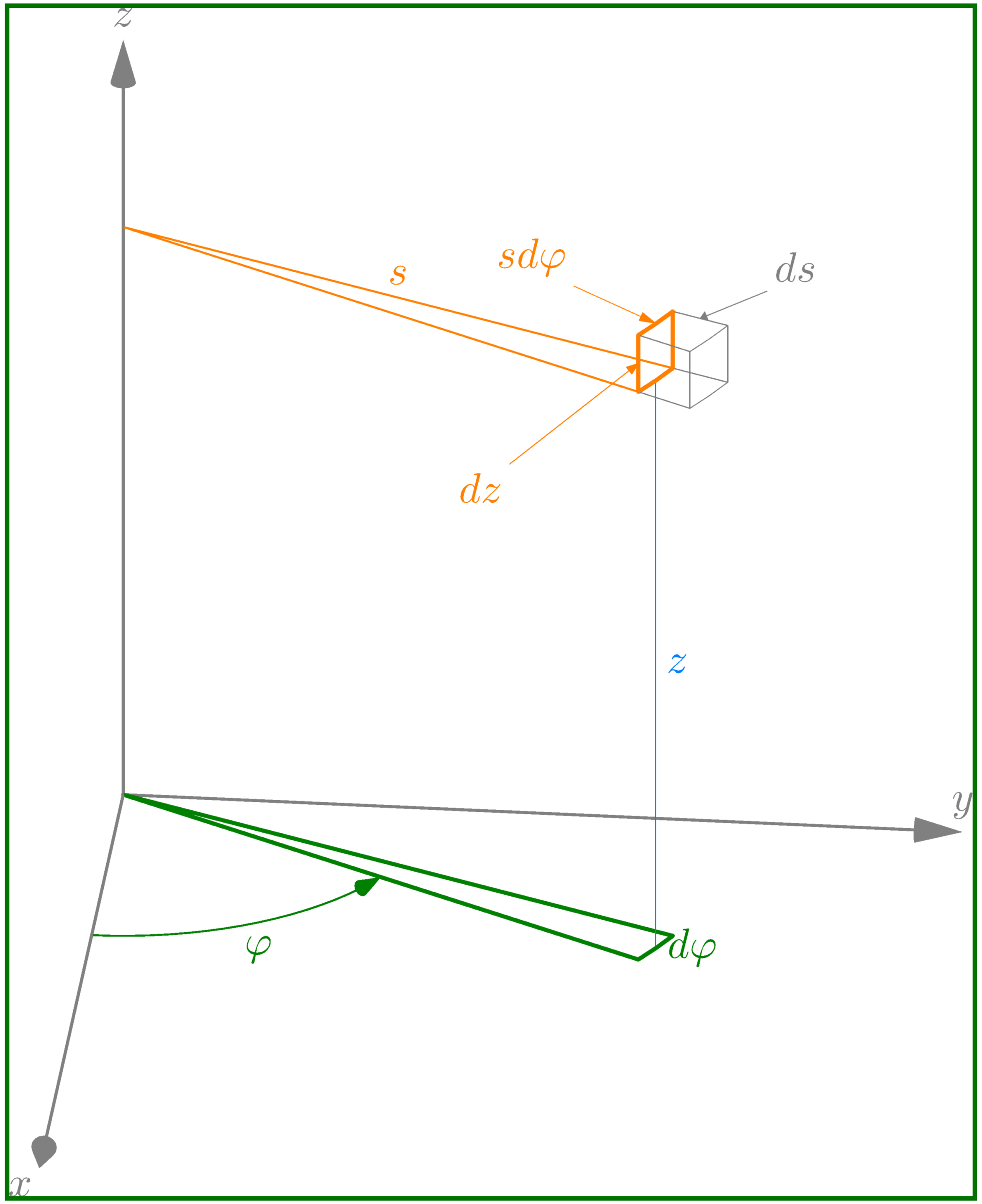
$$\mathrm{d}\vec{\ell} = \mathrm{d}x\,\hat{x} + \mathrm{d}y\,\hat{y} + \mathrm{d}z\,\hat{z}$$

$$\vec{\boldsymbol{\nabla}} T = \frac{\partial T}{\partial x}\hat{x} + \frac{\partial T}{\partial y}\hat{y} + \frac{\partial T}{\partial z}\hat{z}$$



Coordenadas cilíndricas

$$d\vec{\ell} = \mathrm{d}s\,\hat{s} + s\,\mathrm{d}\varphi\,\hat{\varphi} + \mathrm{d}z\,\hat{z}$$

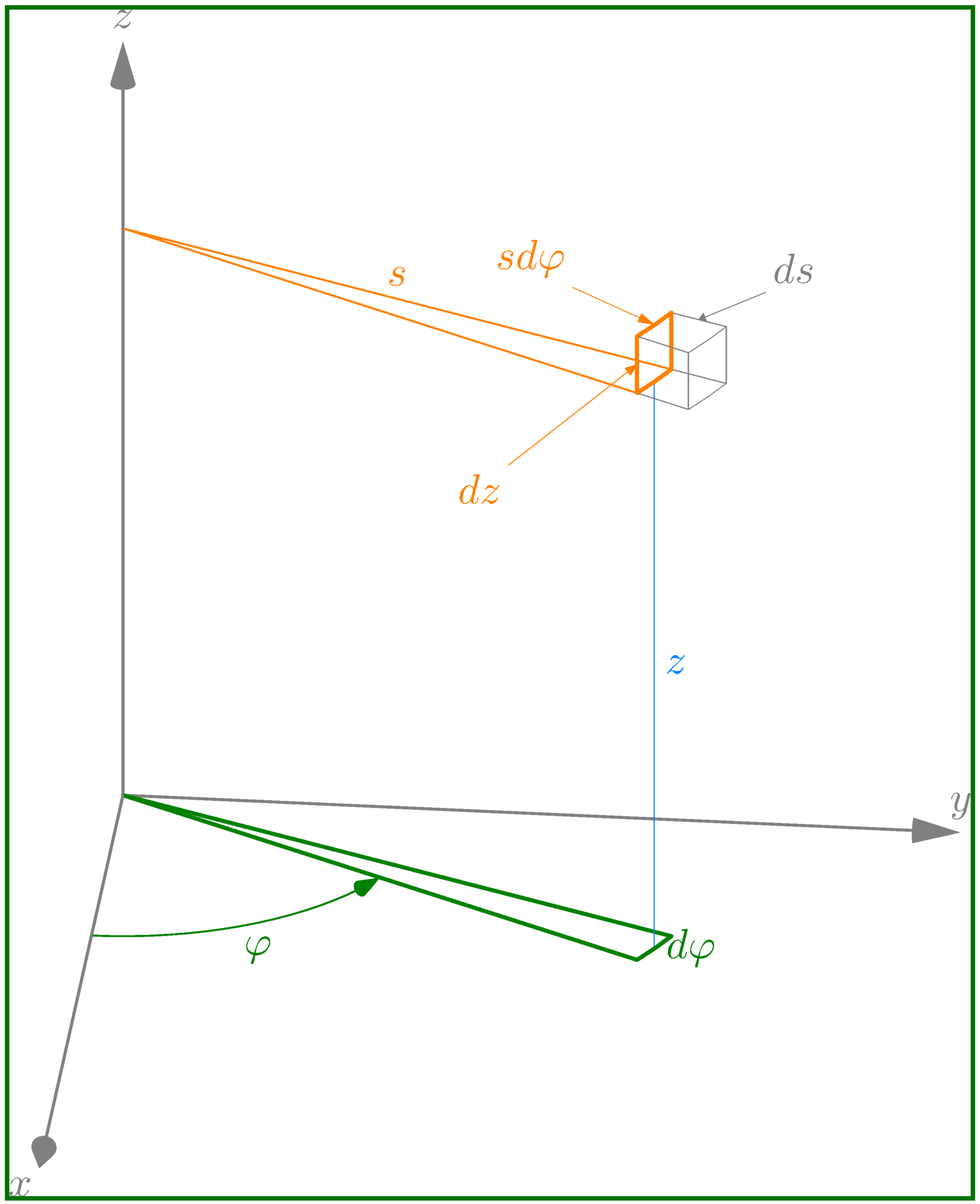


Coordenadas cilíndricas

$$\int_{\mathcal{C}} \vec{\nabla} T \cdot \mathrm{d}\vec{\ell} = T_b - T_a$$

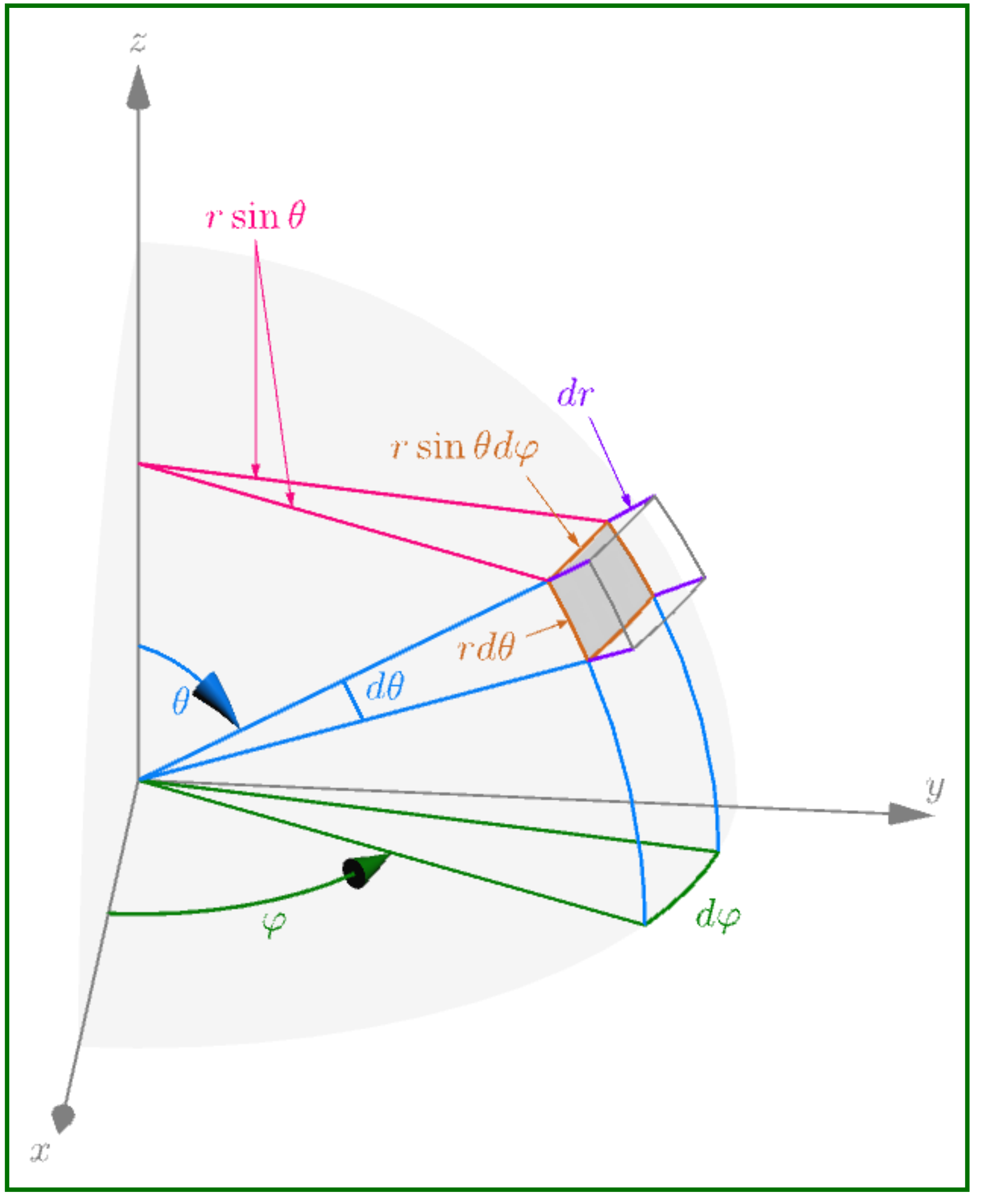
$$\mathrm{d}\vec{\ell} = \mathrm{d}s\, \hat{s} + s\, \mathrm{d}\varphi\, \hat{\varphi} + \mathrm{d}z\, \hat{z}$$

$$\vec{\nabla} T = \frac{\partial T}{\partial s} \hat{s} + \frac{1}{s} \frac{\partial T}{\partial \varphi} \hat{\varphi} + \frac{\partial T}{\partial z} \hat{z}$$



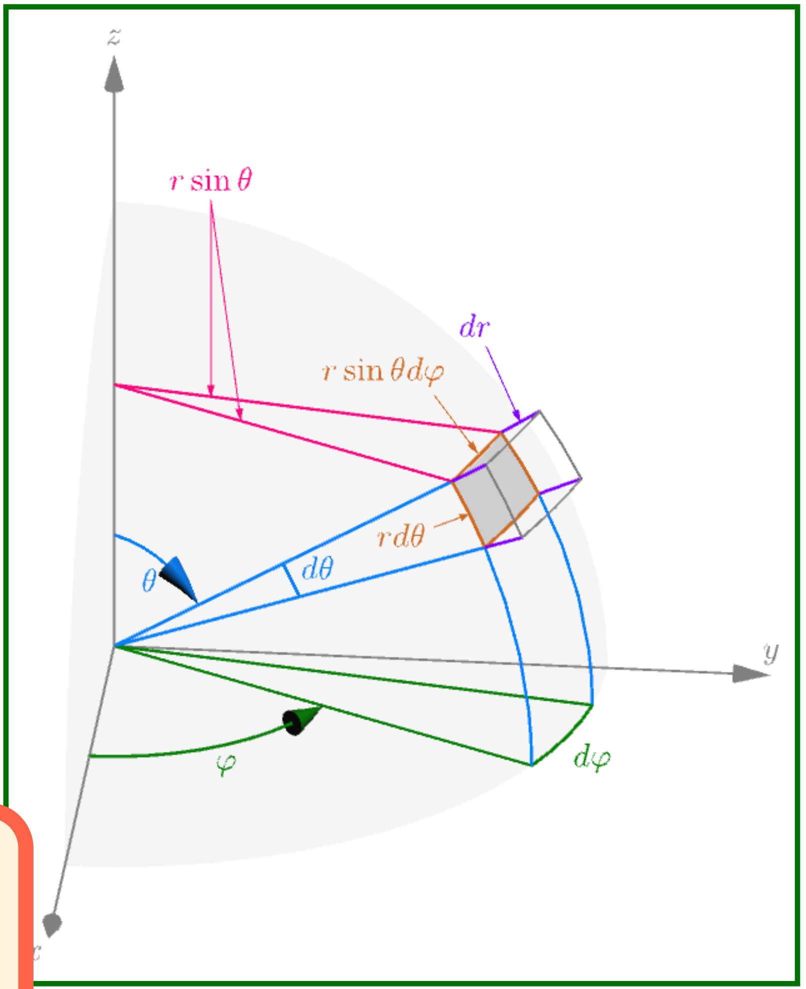
Coordenadas esféricas

$$d\vec{\ell} = dr\,\hat{r} + r\,d\theta\,\hat{\theta} + r\sin\theta\,d\varphi\,\hat{\varphi}$$



Coordenadas esféricas

$$\int_C \vec{\boldsymbol{\nabla}} T \cdot \mathrm{d}\vec{\ell} = T_b - T_a$$



$$\mathrm{d}\vec{\ell} = \mathrm{d}r\,\hat{r} + r\,\mathrm{d}\theta\,\hat{\theta} + r\sin\theta\,\mathrm{d}\varphi\,\hat{\varphi}$$

$$\vec{\boldsymbol{\nabla}} T = \frac{\partial T}{\partial r}\hat{r} + \frac{1}{r}\frac{\partial T}{\partial \theta}\hat{\theta} + \frac{1}{r\sin\theta}\frac{\partial T}{\partial \varphi}\hat{\varphi}$$

Rotacional

$$\int_S \vec{\boldsymbol{\nabla}} \times \vec{\mathbf{v}} \cdot \hat{n}\, \mathrm{d}A = \oint \vec{\mathbf{v}} \cdot \mathrm{d}\vec{\ell}$$

Cartesianas

$$d\vec{\ell} = dx\,\hat{x} + dy\,\hat{y} + dz\,\hat{z}$$

$$\vec{\boldsymbol{\nabla}} \times \vec{\mathbf{v}} = \left(\frac{\partial v_z}{\partial y} - \frac{\partial v_y}{\partial z}\right)\hat{x} + \left(\frac{\partial v_x}{\partial z} - \frac{\partial v_z}{\partial x}\right)\hat{y} + \left(\frac{\partial v_y}{\partial x} - \frac{\partial v_x}{\partial y}\right)\hat{z}$$