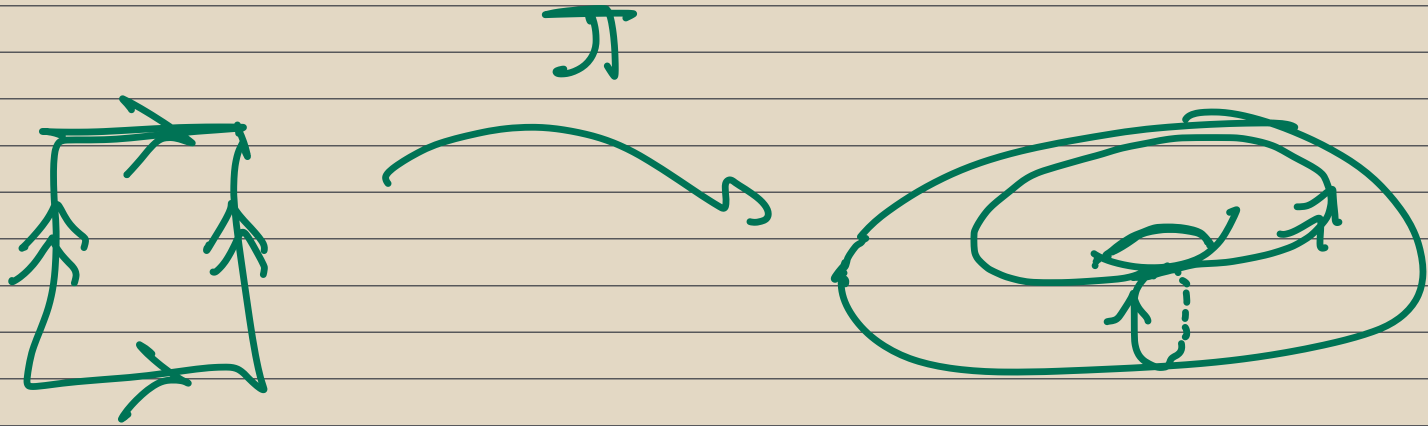
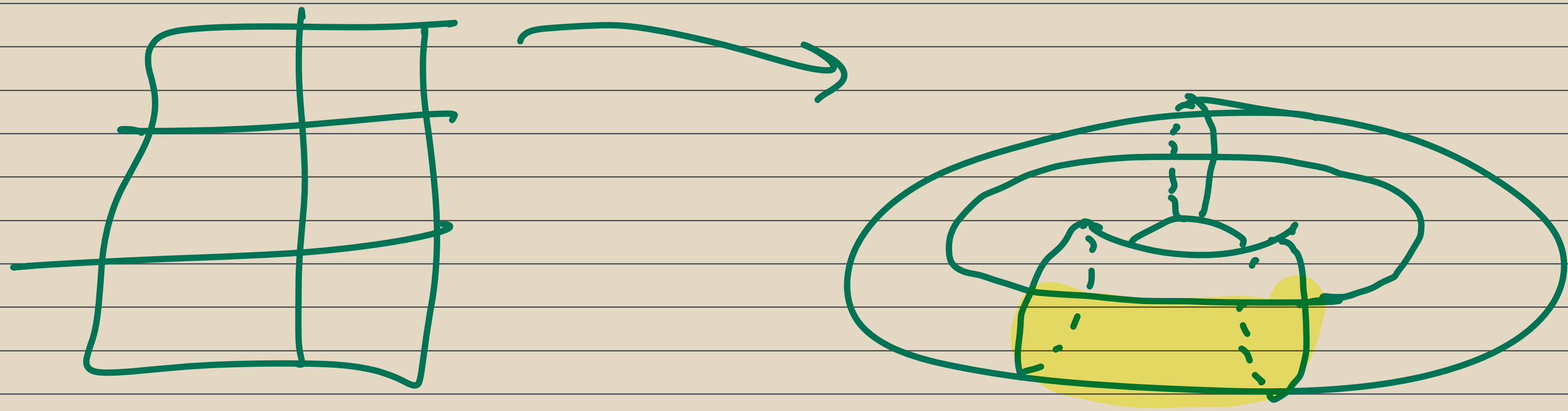


Cont $\qquad \pi : [0,1]^2 \to \mathbb{R}^3$



$$Av = \lambda v$$

$$\frac{d}{dx} : C^{\infty} \longrightarrow C^{\infty}$$

$$\frac{d}{dx} f = f'$$

$$\frac{d}{dx} f = \lambda f \Rightarrow f' = \lambda f$$

$$\boxed{f(x) = \underbrace{Ce^{\lambda x}}}$$

$$\frac{d^2}{dx^2} f = f''$$

$$f'' = \lambda f$$

$$\begin{cases} \lambda > 0 \Rightarrow f(x) = C_1 e^{\sqrt{\lambda} x} + C_2 e^{-\sqrt{\lambda} x} \\ \lambda < 0 \Rightarrow f(x) = C_1 \sin(\sqrt{-\lambda}\, x) + C_2 \cos(\sqrt{-\lambda}\, x) \end{cases}$$

the main equation

Constant related to plasma's property

Curl operator

$$\nabla \times (\nabla \times B) = \mu^2 B$$

Vector Helmholtz Equation

describes how magnetic field behave under certain conditions in plasma

Solve this with FEnics $\rightarrow$ weak form of the equation.

$$\int_\Omega \nabla \times (\nabla \times B) \cdot v \, d\Omega = \mu^2 \int_\Omega B \cdot v \, d\Omega$$

$$\nabla \times (\nabla \times B) = \nabla (\nabla \cdot B) - \nabla^2 B$$

Since $\nabla \cdot B = 0 \implies$

$$\nabla^2 B + \mu^2 B = 0$$

by integration by parts (stokes theorem)

$$\int_\Omega \nabla \times (\nabla \times B) \cdot v \, d\Omega = \int_\Omega (\nabla \times B) \cdot (\nabla \times v) \, d\Omega - \int_{\partial\Omega} \big(\hat{n} \times (\nabla \times B)\big) \cdot v \, ds$$

$\Rightarrow$

$$\mu^2 \int_\Omega B \cdot v \, d\Omega = \int_\Omega (\nabla \times B) \cdot (\nabla \times v) \, d\Omega - \int_{\partial\Omega} \big(\hat{n} \times \underbrace{(\nabla \times B)}_{\mu B}\big) \cdot v \, ds$$

$$\boxed{B \cdot n \overset{!}{=} 0}$$

think