

How to implement a matrix assembly

For example code see magnetostatic or liquid demos

Typical FEM discretization

- Let us work through an example to make things more clear. Consider the PDE

$$\nabla^2 \vec{u} = 0, \quad \nabla \equiv \begin{bmatrix} \partial_x \\ \partial_y \end{bmatrix}, \quad \text{and} \quad \vec{u} \in \mathbb{R}^2$$

- Doing FEM gives the counterpart discrete version for triangle t with nodes i, j, k as

$$\underbrace{\begin{bmatrix} E_{ii} & E_{ij} & E_{ik} \\ E_{ji} & E_{jj} & E_{jk} \\ E_{ki} & E_{kj} & E_{kk} \end{bmatrix}}_{E_t} \begin{bmatrix} u_{x,i} \\ u_{y,i} \\ u_{x,j} \\ u_{y,j} \\ u_{x,k} \\ u_{y,k} \end{bmatrix} = \vec{0}$$