- **Randbedingungen:**

$$\Gamma_B:\ 0 = B\cdot n = \begin{pmatrix}\partial_2 A_3\\ -\partial_1 A_3\\ 0\end{pmatrix}\cdot\begin{pmatrix}n_1\\ n_2\\ 0\end{pmatrix} = \partial_2 A_3\cdot n_1 - \partial_1 A_3 \cdot n_2$$

$$= -\nabla A_3 \times \begin{pmatrix}n_1\\ n_2\end{pmatrix} = \frac{\partial}{\partial \tau} A_3 = 0$$

z.B. $A_3 = 0$ auf Γ_B

$$\Gamma_H:\ \begin{pmatrix}0\\ 0\\ -J_{i,3}\end{pmatrix} = [\underbrace{\nu(|\nabla\times A|)\,\nabla\times A}_{=:H}]\times n =$$

$$= \nu(|\nabla A_3|)\begin{pmatrix}\partial_2 A_3\\ -\partial_1 A_3\\ 0\end{pmatrix}\times\begin{pmatrix}n_1\\ n_2\\ 0\end{pmatrix}$$

$$= \nu(|\nabla A_3|)\begin{pmatrix}0\\ 0\\ \partial_2 A_3 n_2 + \partial_1 A_3 n_1\end{pmatrix}$$

- **Resultat:** 3D Magnetostatik → 2D Magnetostatik

Ges. $u = A_3(x) = A_3(x_1, x_2)$:

$$-\mathrm{div}(\nu(x, |\nabla u|)\nabla u(x)) = J_{i,3} + \frac{\mu_0}{\mu}\left(\frac{\partial H_{02}}{\partial x_1} - \frac{\partial H_{01}}{\partial x_2}\right)$$

$$x = (x_1, x_2) \in \Omega \subset \mathbb{R}^2$$

+ RB auf $\Gamma = \partial\Omega$:

$u = 0$ auf $\Gamma_B = \Gamma_1 = \Gamma_{\text{Dirichlet}}$

$\nu(|\nabla u|)\nabla u\cdot n = -J_{s,3}$ auf $\Gamma_H = \Gamma_2 = \Gamma_{\text{Neumann}}$

- **Beispiel:** Elektromagnet → Folien 12i+j
  Elektrische Maschinen