Remark 3.1

1. \( u \in V_{d} \cap W_{2}^{1,\lambda}(\Omega) \) ensures an integrable trace of \( \frac{\partial u}{\partial n} = (a Du, n) \) on \( \partial \Omega \) (\( \frac{\partial u}{\partial n} \in L_{1}(\partial \Omega) \)), if \( \lambda > 1/2 \) and if \( a(\cdot) \) and \( \partial \Omega \) are "sufficiently" smooth (Sobolev's embedding theorem on manifolds!).

2. Physical meaning of (3):
The balance equation (3) expresses the equilibrium (balance) of the following quantities:

- Total flux through \( \partial \Omega \setminus \partial \Omega_{d} \) + input into \( \Omega \) via connection + reaction by solution-dependent sources \( cu \) and \( x_{y} \)
- Total intensity of the sources given by the intensities of the volume sources \( f \) in \( \Omega \) and the boundary sources \( g \) on \( \partial \Omega_{d} \) (if \( f \neq 0 \))

3. In Section 3.3, we use the balance equation (3) in discrete points \( x \in \Omega = \Omega_{1} \cup \Omega_{2} \cup \Omega_{3} \) (primary grid) and special boxes \( \Omega(x) \) (= secondary grid) for constructing finite difference schemes on arbitrary triangular, rectangular, and combined meshes.

4. The generalization to 3D is trivial!