MATH 521

Assignment 2

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Problem 1. Let $\Omega \subset \mathbb{R}$ be a two-dimensional domain, $a : \Omega \to \mathbb{R}^2$ a two-dimensional, continuously differentiable vector field, $D > 0$ a constant and $g : \partial\Omega \to \mathbb{R}$ a continuous function.

The steady advection-diffusion problem

$$
\begin{aligned}
\boldsymbol{\nabla} \cdot (u\mathbf{a}) - \boldsymbol{\nabla} \cdot (D\boldsymbol{\nabla}u) &= 0 &&\text{in } \Omega \\
u &= g &&\text{on } \partial\Omega
\end{aligned}
$$

describes how a certain density u is transported through the domain Ω.

Solution. Placeholder. $\square$

Problem 2. Placeholder.

Solution. Placeholder. □