École polytechnique fédérale de Lausanne

Semester project fall/spring 202X or Master thesis fall/spring 202X

Bachelor or Master in Mathematics or Minor heading such as course title

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Title of your document
Second line of your title

Author:
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Supervisor:
First Name Last name

Contents

1 Introduction

In this project we analyse a model for describing the trajectory of particles of pollutants in groundwater. A successful model for describing underground flows is given by the uncertain Darcy problem. Given a domain D such that its boundary ∂D is divided in three subsets $\Gamma_{\text{in}}, \Gamma_{\text{out}}, \Gamma_N$ such that

$$\Gamma_{\text{in}} \cup \Gamma_{\text{out}} \cup \Gamma_N = \partial D, \quad \Gamma_{\text{in}} \cap \Gamma_{\text{out}} \cap \Gamma_N = \emptyset,$$

the pressure and velocity fields p and u are given by the solution of the following Partial Differential Equation (PDE)

$$\begin{cases} u = -A\nabla p, & \text{in } D, \\ \nabla \cdot u = f, & \text{in } D, \\ p = p_0, & \text{on } \Gamma_{\text{in}}, \\ p = 0, & \text{on } \Gamma_{\text{out}}, \\ \nabla p \cdot n = 0, & \text{on } \Gamma_N, \end{cases} \tag{1}$$

where Γ_{in}, Γ_{out} are the inlet and outlet portions of the boundary of D, and an impermeability condition is imposed on Γ_N.

2 Title of section

Let D be a subset of $\mathbb{R}^d$ and $W(t)$ be a vector of m independent Brownian motions and two functions $f\colon \mathbb{R}^d \to \mathbb{R}^d$, $g\colon \mathbb{R}^d \to \mathbb{R}^{d\times m}$. We consider the following stochastic differential equation (SDE)

$$\begin{cases} dX(t) = f(X(t))dt + g(X(t))dW(t), & 0 < t \le T, \\ X(0) = X_0, & X_0 \in D. \end{cases} \tag{2}$$

The problem is equipped with two different types of boundary conditions, namely

i. some item

ii. another one

2.1 Title of subsection

Look at the appendix. but also let us cite some famous mathematicians, such as [1], [2] and [3].

2.1.1 Title of subsubsection

Some figures of the MA building at EPFL.

(a) Put your sub-caption here

(b) Put your sub-caption here

Figure 1: Put your caption here

3 Conclusion

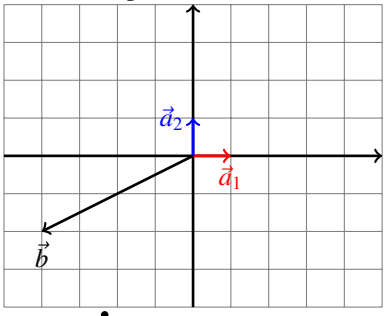
In this project we did a lot of things.

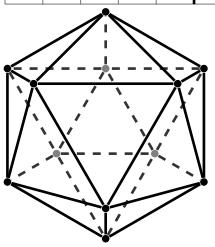
Appendix A Symbols

In the The Comprehensive LaTeX Symbol List, one can find a **lot** of symbols. Such as
$\therefore$ $\boxed{\eth}$ $\oint$ $\rightsquigarrow$ $\nleftrightarrow$ or even some non-maths ones 👻 🏂.

Appendix B Using tikz for drawing

Tikz can help you draw some nice things. but other tools exist as well. Take a look at Tikz pour l'impatient
Some examples:





References

[1] L. Euler. *Elémens d'algèbre*. Elémens d'algèbre. chez Bruyset ainé & Compagnie, 1795.

[2] R. A. Fisher. *Contributions to Mathematical Statistics*. Wiley, New York, 1950.

[3] Maryam Mirzakhani. Simple geodesics and Weil–Petersson volumes of moduli spaces of bordered Riemann surfaces. *Inventiones Mathematicae*, 167(1):179–222, 2006.