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Dept. of Hydraulic Engineering and Water Resources Management
Institute for Modelling Hydraulic and Environmental Systems (IWS)

Declaration

I declare that I have developed and written the enclosed thesis completely by myself and that I have not used sources or means without declaration in the text. Any thoughts from others or literal quotations are clearly marked. The thesis was not used in the same or in a similar version to achieve an academic grading or is being published elsewhere. The enclosed electronic version is identical to the printed versions.

The main text, ideas, analyses, and conclusions presented in this thesis are my own, produced without the use of artificial intelligence (AI) tools for creative or substantive writing. I confirm that AI language models (e.g., ChatGPT) were only used to provide assistance in spelling, grammar, and minor editorial refinements. These tools were not employed in generating new content, forming arguments, or conducting the research work described. I take full responsibility for the originality, accuracy, and integrity of the thesis.

I agree that the present work is made available for scientific purposes in the libraries of the Institute for Water and Environmental Systems, University of Stuttgart (published according § 6 Abs. 1 UrhG (Copyright Act) and thereof can be cited under § 51 of the UrhG (Copyright Act).

Acknowledgments

add your Acknowledgments

Abstract

Abstracts should not be more than one page. A thesis written in Germany requires an additional English abstract.

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Notation

Roman letters

Letter	Unit	Description
x	m	streamwise coordinate, pointing in the upstream direction
y	m	spanwise coordinate, pointing toward the right bank
z	m	vertical coordinate, pointing against gravity acceleration vector

Greek letters

Letter	Unit	Description
η	—	porosity
Φ	—	dimensionless bedload transport

Acronyms, abbreviations, and subscripts

CFD	Computational Fluid Dynamics
GIS	Geographic Information System
GUI	Graphical User Interface
OS	Operating System

Note: SI unit abbreviations like "a" for annum or "m" for meter are not listed.

Chapter 1

Introduction

Welcome!

This template is provided at <https://github.com/Ecohydraulics/latex-thesis-template> and can be cloned with (requires [GitBash](#)):

```
git clone https://github.com/Ecohydraulics/latex-thesis-template
```

1.1 Background

Example reference to Figure 1.1, which is based on (Kim, 2017). If you need to introduce abbreviations like Operating System (OS), or parameters like the dimensionless bed load transport Φ , make sure to also define them at the beginning in `notations.tex`.

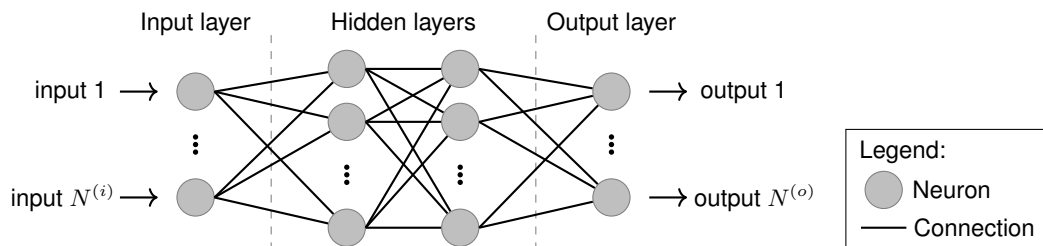


Figure 1.1: Structure of a neural network.

1.2 Motivation

Delineate the research gap (max. 2 pages).

1.3 Research question

Based on the research gap defined in section 1.2, define the hypothesis here:

Research question & hypotheses

What is needed because of the research gap (no Yes-or-No question)?

My test hypotheses are:

- (i) A specific aspect that can be boolean (True-or-False), which I test for answering the research question.
- (ii) Another specific aspect that can be boolean (True-or-False), which I test for answering the research question.

Chapter 2

State-of-the-Art

Check what others have done, which is relevant to your research question and to provide evidence for testing the hypotheses defined in section 1.3.

For coherence: note that chapter titles should be *Camel Cased*, while everything else is *Sentence cased*, including all kinds of section names.

2.1 Previous works

As explained in Negreiros et al. (2024).

2.2 Types of something and image manipulation

Do Kundu and Cohen (2008) talk about Lagrangian and Eulerian concepts visualized in Figure 2.1?

All figures and images should be stored in the `images` folder, so that in the `figure` environment, typing the image filename without the extension (JPG, PNG, etc.) in the `\includegraphics` command is sufficient.

Note that saving graphics in JPG format is usually the best option, and PNG is only useful for charts with low pixel coverage.

JPG is suitable for photographs and complex images where a smaller file size is important. It uses lossy compression, which reduces file size substantially. When using the JPG format for a thesis report, be sure to save at 300 dpi (dots per inch).

PNG is best used when you need lossless compression (heavy files!) and transparency support. It is ideal for charts with sharp edges, text, or areas of **solid** color, as it preserves detail without introducing compression artifacts.

GNU Image Manipulation Program, GIMP, is a powerful open-source image editing software suitable for a wide range of tasks, including photo retouching, image composition, and graphic design. It supports various file formats, including PNG and JPG, and provides advanced tools such as layer management, customizable brushes, and color correction features. GIMP is an excellent free alternative to commercial software, making it a great choice for students who ambition high-quality image editing capabilities without licensing costs.

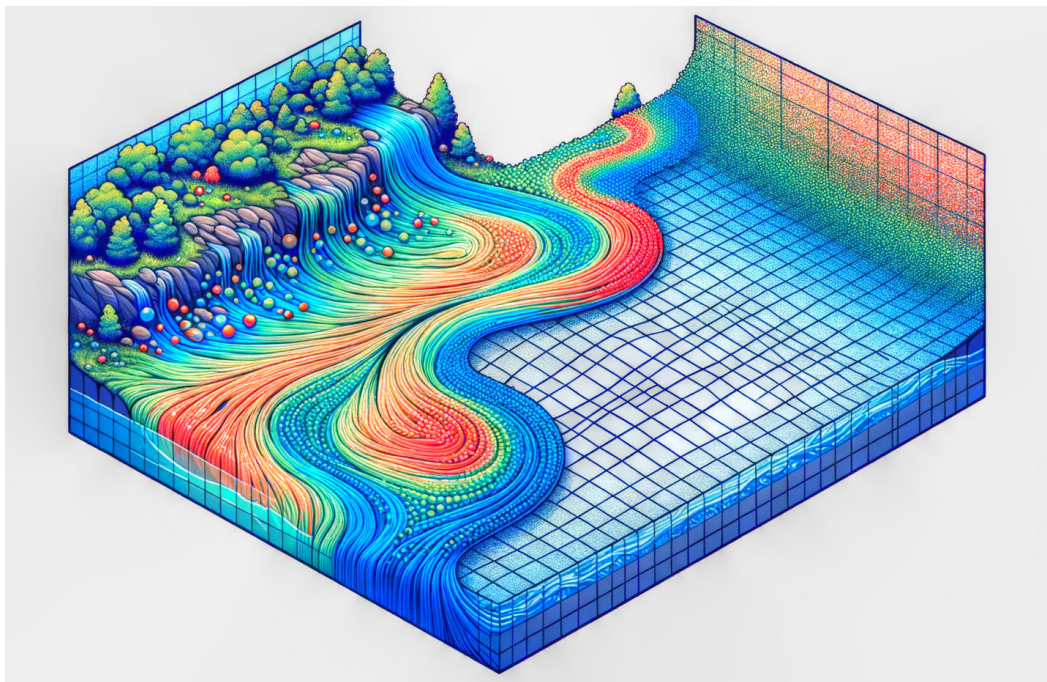


Figure 2.1: An example figure that visually tries to integrate Lagrangian and Eulerian concepts.

2.2.1 A subsection with table

As the Table 2.1 shows, this text has to introduce the thing before the table lists the use of the thing.

Table 2.1: Captions of tables should be positioned above the table, while figure captions should be in the bottom

Thing	Use
something	something
something	something
something	something

2.2.2 No subsection goes alone

And it should also have some text.

2.3 Something statistics with an equation

As shown in Equation 2.1

$$\text{happiness} = \frac{\text{EmptyCup} + \text{FavoriteDrink}}{\text{EmptyCups}} \quad (2.1)$$

2.4 A section header

2.4.1 The logic underlying something in a DEF BOX

Definition: The thing

This is the definition of the thing.

2.4.2 Concepts and terminology

Something set rules

Understanding the semantics of something

2.5 Something or nothing?

Unnumbered non-sense header?**The note**

Do you really need to do so much numbering?

Chapter 3

Methods

Describe the methods that **you** use to answer the research question. Remember: your goal is to provide a pathway for testing the hypotheses defined in section 1.3.

3.1 Algorithms

To explain your algorithms, use the boilerplate templates from our thesis class. For example:

```
1 def add_one(par):
2     """
3     :param int par: an integer input parameter
4
5     A simple function that adds one
6     """
7     return par += 1
```

Single commands or function_names can be written using the `\inlinecode` for general code, `python run_script.py` for shell commands, or `\inlinepy` for python_items.

3.2 Commands

Commands send to terminal can be written in a terminal environment, for instance, with guidance for cloning a repository:

```
git clone https://github.com/Ecohydraulics/latex-thesis-template
```

In-line, commands like `git clone` can be added.

However, for directories and filenames, use `/dir/to/code.py`.

Chapter 4

Results

Present your results here. This section should not include and reference (citation) because you are presenting your results. If you need a reference, the sentence you are about to write probably better fits into the state-of-the-art, methods, or discussion.

Remember: your goal is to provide evidence for testing the hypotheses defined in section 1.3.

Chapter 5

Discussion

Describe logical links that can be inferred from your results here. How do the results help to test the hypotheses stated in section 1.3?

- **Do not** write: "The hypothesis is True" or "The hypothesis is False".
- **Do** write: "No evidence was found that the hypothesis is false." or "Evidence was found that the hypothesis is false."

Now, how does this help answering the research question; what remains uncertain; what are weaknesses in the methods? (This should be discussed here.)

Why so complicated?

From a scientific perspective, we can never be absolutely sure about the truth of a hypothesis. This is why we need to use this complicated writing.

Chapter 6

Conclusions

Not an abstract: summary of **new insights gained from this thesis based on the research question**, and as per the discussion.

- **Do not** mention out-of-the-Blue new information, not use math symbols or other abbreviations, and not summarize the introduction and motivation.
- **Do** extract the principal novelty here, which results from your own genuine work

References

- Kim, P. (2017). Neural network. In *MATLAB deep learning: With machine learning, neural networks and artificial intelligence* (pp. 19–51). Berkeley, CA: Apress. Retrieved from https://doi.org/10.1007/978-1-4842-2845-6_2 doi: 10.1007/978-1-4842-2845-6_2
- Kundu, PK., & Cohen, IM. (2008). *Fluid Mechanics* (4th ed.). San Diego, CA, USA: Elsevier Inc. Retrieved from <https://www.sciencedirect.com/book/9780124059351/fluid-mechanics>
- Negreiros, B., Schwindt, S., Scolari, F., Barros, R., Galdos, A. A., Noack, M., ... Wieprecht, S. (2024, January). A database application framework toward data-driven vertical connectivity analysis of rivers. *Environmental Modelling & Software*, 172, 105916. Retrieved 2024-08-08, from <https://www.sciencedirect.com/science/article/pii/S136481522300302X> doi: 10.1016/j.envsoft.2023.105916

References

Appendices

References

Appendix A

Something to Complement

A.1 Maps, for example