

Отчёт по лабораторной работе №4

Including Graphics

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Целью данной лабораторной работы является ознакомление с основами включения графики в документы LaTeX.

The purpose of this lab work is to learn how to include and manipulate graphics in LaTeX documents using the `graphicx` package and related tools.

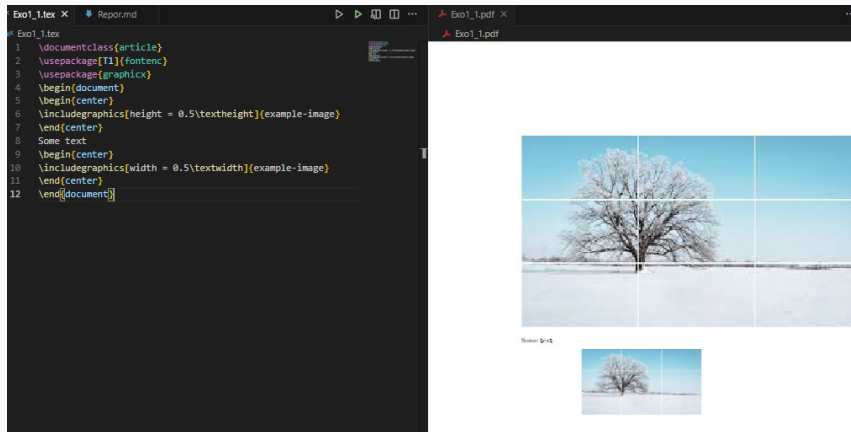
1. Study basic image inclusion with graphicx package
2. Learn to modify graphic appearance (size, rotation, scaling)
3. Understand float environments for image placement
4. Practice file naming and organization best practices
5. Learn cross-referencing for figures
6. Explore different float types and positioning options
7. Complete the exercises with practical examples

Теоретическое введение

Для включения внешних изображений в LaTeX используется пакет **graphicx**, который предоставляет команду `\includegraphics`. To include external images in LaTeX, use the **graphicx** package which provides the `\includegraphics` command.

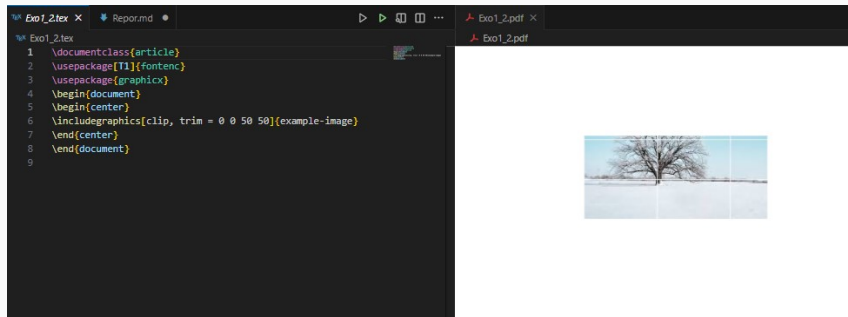
4.1 Изменение внешнего вида графики / Altering Graphic Appearance

Команда `\includegraphics` имеет множество опций для управления размером и формой изображений. The `\includegraphics` command has many options to control image size and appearance.



4.2 Создание плавающих изображений / Making Images Float


Изображения обычно включаются как плавающие объекты (floats) чтобы избежать больших пробелов на странице. Images are typically included as floats to avoid large gaps on the page.



4.3 Размещение плавающих объектов / Placing Floats

Пакет `float` предоставляет опцию `H` для точного размещения плавающих объектов. The `float` package provides the `H` option for precise float placement.

```
Exo2.tex > {} Figure: An example image
1 \documentclass{article}
2 \usepackage[T1]{fontenc}
3 \usepackage{graphicx}
4 \usepackage{lipsum} % produce dummy text
5 \begin{document}
6 \lipsum[1-4] % Just a few filler paragraphs
7 Test location.
8 \begin{figure}[ht]
9 \centering
10 \includegraphics[width=0.5\textwidth]{example-image}
11 \caption{An example image}
12 \end{figure}
13 \lipsum[6-10] % Just a few filler paragraphs
14 \end{document}
15
```


**Build with
agent
mode**

AI responses may
be inaccurate.

Generate Agent
Instructions to
onboard AI onto
your codebase.

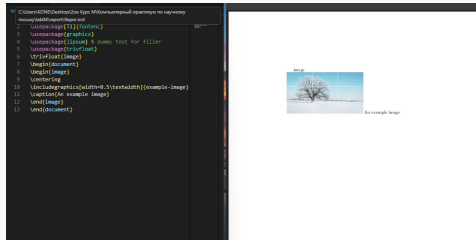
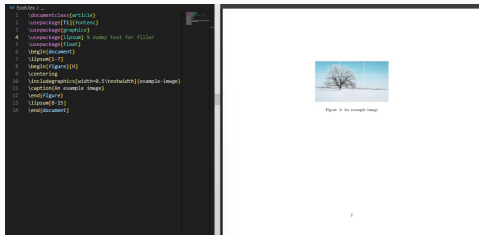
[1-4] Test location. [6-10]



Figure 1: An example image

4.4 Перекрёстные ссылки / Cross-referencing

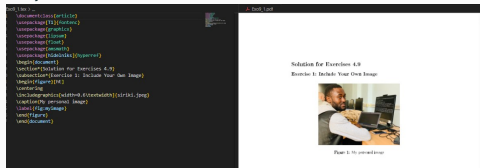
Механизм `\label` и `\ref` позволяет создавать ссылки на пронумерованные элементы. The `\label` and `\ref` mechanism allows creating references to numbered elements.



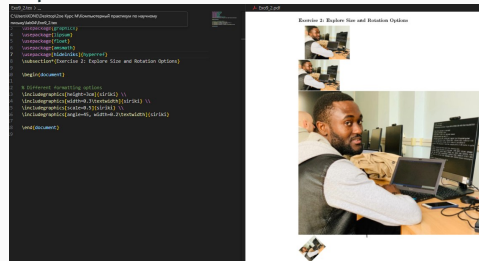
Выполнение лабораторной работы

Упражнение 1-2: Включение изображений и опции размера

Упражнение 1



Упражнение 2



Упражнение 3-4: Сравнение размеров и размещение

Упражнение 3

```
1 %%% Exercise 3: Compare \textwidth vs. \linewidth
2 \documentclass[11pt]{report}
3 \usepackage{graphicx}
4 \usepackage{lipsum}
5 \usepackage{float}
6 \usepackage{caption}
7 \usepackage{tikz}
8 \usepackage{hyperref}
9 \begin{document}
10
11 \lipsum[1]
12
13 \begin{figure}[H]
14 \centering
15 \includegraphics[width=0.8\textwidth]{air11}
16 \caption{Using \textwidth to set width}
17 \end{figure}
18
19 \begin{figure}[H]
20 \centering
21 \includegraphics[width=0.8\linewidth]{air11}
22 \caption{Using \linewidth to set width}
23 \end{figure}
24
25 \lipsum[2-3]
26 \end{document}
```

Exercise 3: Compare \textwidth vs. \linewidth

Let's take a look at two examples of how to use the \includegraphics command. The first example uses \textwidth to set the width of the image. The second example uses \linewidth to set the width of the image. The difference between the two is that \textwidth is the width of the text block, while \linewidth is the width of the page. In this case, \textwidth is the correct choice because we want the image to fit within the text block.



Figure 3: Using \textwidth

Now that we have seen how to use \textwidth and \linewidth, let's look at another example. This time we will use the \caption command to add a caption to the image. The caption is placed below the image and is enclosed in a box. This is useful for providing a description of the image and for making it easier to find in the document.

Упражнение 4

```
1 %%% Exercise 4: Float Placement with Different Specifiers
2 \documentclass[11pt]{report}
3 \usepackage{graphicx}
4 \usepackage{lipsum}
5 \usepackage{float}
6 \usepackage{caption}
7 \usepackage{tikz}
8 \usepackage{hyperref}
9 \begin{document}
10
11 \lipsum[1-2]
12
13 \begin{figure}[h]
14 \centering
15 \includegraphics[width=0.4\textwidth]{example-image-a}
16 \caption{Option h (here)}
17 \label{fig1}
18 \end{figure}
19
20 \lipsum[3]
21 \begin{figure}[t]
22 \centering
23 \includegraphics[width=0.4\textwidth]{example-image-b}
24 \caption{Option t (top)}
25 \label{fig2}
26 \end{figure}
27
28 \begin{figure}[b]
29 \centering
30 \includegraphics[width=0.4\textwidth]{example-image-c}
31 \caption{Option b (bottom)}
32 \label{fig3}
33 \end{figure}
34
35 \lipsum[4-8]
36 \textbf{Observed interactions:}
37 \begin{itemize}
38 \item \texttt{[h]} : Tries to place the float at the exact location
39 \item \texttt{[t]} : Priority for top of page
40 \item \texttt{[b]} : Priority for bottom of page
41 \end{itemize}
42 \end{document}
```

Exercise 4: Float Placement with Different Specifiers

This exercise demonstrates how to use the \begin{figure} environment to place a figure in the document. The figure is placed at the top of the page, and the caption is placed below it. The figure is centered and has a width of 0.4\textwidth. The caption is also centered and has a width of 0.4\textwidth. The figure is labeled fig1, and the caption is labeled fig1. The figure is placed at the top of the page, and the caption is placed below it. The figure is centered and has a width of 0.4\textwidth. The caption is also centered and has a width of 0.4\textwidth. The figure is labeled fig1, and the caption is labeled fig1.


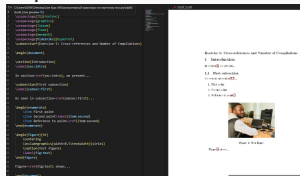


Figure 4: Using \textwidth

Now that we have seen how to use \textwidth and \linewidth, let's look at another example. This time we will use the \caption command to add a caption to the image. The caption is placed below the image and is enclosed in a box. This is useful for providing a description of the image and for making it easier to find in the document.

Упражнение 5-7: Перекрёстные ссылки

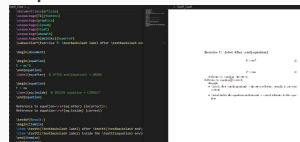
Упражнение 5



Упражнение 6



Упражнение 7



Выводы

В ходе лабораторной работы №4 я изучил основы включения и управления графикой в документах LaTeX. Освоил работу с пакетом **graphicx**, научился создавать плавающие объекты, управлять их размещением и создавать перекрёстные ссылки на изображения.

In this lab work #4, I learned the fundamentals of including and manipulating graphics in LaTeX documents. I mastered the **graphicx** package, learned to create float objects, control their placement, and create cross-references to images.

Список литературы

Спасибо за внимание
