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STYLES IN LATEX: REVIEW AND APPLICATION

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Abstract: *This article provides a comprehensive review of style usage in LaTeX and explores their practical applications in scientific and technical writing. LaTeX, as a high-quality typesetting system, allows users to precisely control the appearance and formatting of documents through the use of styles, making it a preferred tool in academia and publishing. The article begins by explaining the core concepts of LaTeX styling, including the role of document classes (article, report, book, etc.) and packages (geometry, fancyhdr, titlesec, xcolor, among others) that enhance document design. It then delves into the mechanisms of style customization, such as altering fonts and font sizes, modifying section headings, adjusting margins, controlling spacing, and applying color schemes. The use of predefined style templates (such as IEEEtran, ACM, or Springer) is discussed in the context of standardizing the appearance of publications. Furthermore, guidance on creating custom .sty files for specific institutional or publishing requirements is provided. A comparative analysis of popular style-related packages is included to highlight their features, strengths, and limitations. For instance, memoir offers an all-in-one document class for advanced styling, while KOMA-Script is praised for its modern typographical features. The article also explores common pitfalls when combining multiple packages and presents best practices for avoiding conflicts. Practical examples illustrate how styles can be applied to tailor a document for theses, journal articles, technical manuals, and conference proceedings. These examples demonstrate both the power and the learning curve associated with LaTeX styling. In conclusion, the article emphasizes the flexibility, consistency, and automation that LaTeX styles provide, and offers practical recommendations for leveraging these capabilities efficiently. Whether the goal is to adhere to strict formatting guidelines or to enhance document aesthetics, mastering LaTeX styles is essential for producing professional-quality documents.*

Keywords: *Document styling, document classes, custom style files, LaTeX packages, formatting techniques, typography control, scientific and technical publications, document automation, section formatting, font customization, color schemes, predefined templates, style customization, academic writing, technical typesetting, layout management, publication standards, visual consistency, automated formatting tools.*

СТИЛИ В LATEX: ОБЗОР И ПРИМЕНЕНИЕ

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Аннотация: *В статье представлен всесторонний обзор использования стилей в LaTeX и рассмотрены их практические применения в научной и технической литературе. LaTeX, как система высококачественной вёрстки, позволяет пользователям точно контролировать внешний вид и форматирование документов с помощью стилей, что делает её предпочтительным инструментом в академической среде и издательском деле. Статья начинается с объяснения основных концепций стилизации в LaTeX, включая роль классов документов (article, report, book и др.) и пакетов (geometry, fancyhdr, titlesec, xcolor и других), которые расширяют возможности оформления документов. Далее подробно*

рассматриваются механизмы настройки стилей: изменение шрифтов и их размеров, модификация заголовков разделов, регулировка полей, управление межстрочными интервалами и применение цветовых схем. Обсуждается использование готовых стилевых шаблонов (таких как IEEEtran, ACM или Springer) для стандартизации оформления публикаций. Также приводятся рекомендации по созданию собственных файлов .sty для удовлетворения требований конкретных учреждений или издательств. В статье проводится сравнительный анализ популярных пакетов, связанных со стилями, с выделением их особенностей, преимуществ и ограничений. Например, класс memoir предлагает комплексное решение для продвинутой стилизации, а KOMA-Script высоко оценивается за современные типографские возможности. Также рассмотрены типичные проблемы, возникающие при комбинировании нескольких пакетов, и представлены лучшие практики по избежанию конфликтов. Практические примеры иллюстрируют, как стили можно применять для адаптации документов под диссертации, журнальные статьи, технические руководства и материалы конференций. Эти примеры демонстрируют как мощь, так и кривую обучения LaTeX-стилизации. В заключение подчёркивается гибкость, согласованность и автоматизация, которые предоставляют стили LaTeX, и даются практические рекомендации по эффективному использованию этих возможностей. Независимо от того, требуется ли строгое соблюдение форматирования или улучшение эстетики документа, освоение стилей LaTeX является необходимым условием для создания профессиональных документов высокого качества.

Ключевые слова: *Стили LaTeX, классы документов, пользовательские .sty-файлы, пакеты оформления, типографика, научные публикации, настройка шрифтов, цветовые схемы, шаблоны стилей, автоматизация документов, академическая вёрстка.*

LaTeX provides powerful tools for text formatting, allowing users to change the appearance of documents using styles and packages. It is widely used in academia due to its flexibility and high typographic accuracy. This article discusses the main aspects of working with styles in LaTeX, as well as the principles of creating custom styles and integrating them into the workflow. It also covers popular packages that simplify working with texts, mathematical formulas, tables, and charts.

The use of styles in LaTeX plays an important role in preparing scientific papers, presentations, and reports. It allows not only the automation of formatting but also the creation of a consistent appearance of documents, which is especially important in publishing and educational institutions.

LaTeX is a high-quality typesetting system widely used for producing scientific and technical documents. One of its most powerful features is the ability to apply styles systematically through document classes, packages, and custom definitions. These styles not only ensure consistency in formatting but also improve the efficiency of document preparation. This paper explores the mechanisms and practical benefits of styling in LaTeX, emphasizing its role in academic writing, technical documentation, and professional publishing. It addresses how LaTeX styles can be tailored to suit different publication requirements and discusses their relevance in a digital-first, automation-driven research environment.

Materials and Methods

The study involved a comprehensive review and comparative analysis of commonly used LaTeX document classes (article, report, book, IEEEtran, etc.) and popular styling packages (e.g., fancyhdr, geometry, titlesec, xcolor, fontspec). Test documents were created to evaluate how different style configurations impact layout, readability, and formatting consistency. Custom style files (.sty) were also designed to explore the flexibility of user-defined formatting rules. The methods included hands-on experimentation using Overleaf and local TeX distributions (TeX Live and MiKTeX), focusing on practical scenarios such as thesis formatting, journal article layout, and presentation design.

The results of this study reinforce LaTeX’s status as a superior platform for producing well-structured, professional-quality documents, particularly in academic and technical fields. Compared to traditional WYSIWYG editors, LaTeX offers a separation of content and formatting, which aligns closely with the best practices in scientific publishing. This modular approach enables users to focus on substance while relying on classes and style files to enforce formatting standards.

The findings align with previous studies highlighting the robustness of LaTeX for academic use. For example, research comparing LaTeX and Word in scholarly contexts (e.g., Knauff & Nejasmic, 2014) noted that LaTeX users often produce more consistent, better-formatted outputs, particularly in documents involving mathematical notation or complex layouts. Our review extends this understanding by demonstrating how style elements—both built-in and custom—further streamline and enhance this process.

Significantly, this work underscores the importance of style customization in institutional and publisher-specific workflows. While default classes offer structure, they often fall short when dealing with unique formatting guidelines. In such cases, the use of .sty files to encapsulate formatting rules proves to be not only efficient but also scalable, especially when producing multiple related documents such as articles, reports, and theses.

Moreover, the integration of modern packages like fontspec, xcolor, and geometry reflects LaTeX's evolution from a rigid typesetting tool to a flexible platform capable of meeting contemporary design standards. These advancements make LaTeX more accessible to a wider range of users, including those working in interdisciplinary fields where visual presentation matters.

In essence, the study positions LaTeX styling not merely as a formatting tool, but as a component of scholarly communication infrastructure—one that ensures clarity, repeatability, and professional quality in document creation.

Packages and Their Use

There are numerous packages available to extend LaTeX’s capabilities. The most useful ones include:

- amsmath – advanced features for working with mathematical formulas;
- color – support for color formatting;
- hyperref – adding hyperlinks;
- showkeys – visualization of label references;
- enumitem – customization of lists;
- cleveref – intelligent link management;
- url – correct formatting of links;
- pgfplots – creating plots;
- booktabs – creating professionally formatted tables;
- biblatex – managing bibliographies.

The use of the microtype package significantly improves the typography of documents by enhancing word breaks and spacing.

Definition of Commands

In LaTeX, you can create custom commands to improve workflow. For example:

```
\newcommand{\D}[2]{\frac{\partial #2}{\partial #1}}
\newcommand{\DD}[2]{\frac{\partial^2 #2}{\partial #1^2}}
\renewcommand{\vec}[1]{\boldsymbol{#1}}
```

These commands simplify writing mathematical expressions and make the code more readable.

Working with Tables

One of LaTeX's powerful tools is creating tables. To format them, you can use the booktabs package:

```
\begin{table}[h]
\centering
\begin{tabular}{lcr}
\toprule
```

```
Name & Value & Description \\
\midrule
Alpha & 10 & First row \\
Beta & 20 & Second row \\
Gamma & 30 & Third row \\
\bottomrule
\end{tabular}
\caption{Example Table}
\label{tab:example}
\end{table}
```

Font Settings

In LaTeX, you can change the document's fonts using various packages:

- times – Times New Roman font;
- helvet – Helvetica font (similar to Arial);
- courier – monospaced Courier font;
- fontspec (only for XeLaTeX and LuaLaTeX) – support for arbitrary system fonts.

Example of setting the Times New Roman font:

```
\usepackage{times}
```

To use a custom font in XeLaTeX, you can apply:

```
\usepackage{fontspec}
\setmainfont{Arial}
```

Creating a Custom Style

You can create your own style, save it in a file called custom_style.sty, and add it to the document using:

```
\usepackage{custom_style}
```

Example of a Custom Style:

```
\usepackage{microtype,xcolor}
\usepackage[colorlinks]{hyperref}
\pagestyle{headings}
\renewcommand{\MakeUppercase}[1]{\color{blue}\textsf{#1}}
```

This style changes the page headings to blue and sets the font to sans-serif.

Working with Publishing Styles

Many publishers provide their own styles and document classes, which may be outdated or incompatible with modern LaTeX features. In such cases, you can use methods to override commands:

```
\let\theorem\relax
\let\corollary\relax
\makeatletter\let\c@theorem\relax\makeatother
```

These commands allow you to disable predefined publisher styles and use your own custom settings.

Creating Presentations

To create presentations in LaTeX, you can use the beamer class, but it requires learning new commands. An alternative is to use standard LaTeX with the geometry package:

```
\documentclass[12pt]{article}
\usepackage[paperwidth=128mm, paperheight=72mm, margin=7ex]{geometry}
```

Presentations created using the beamer class are widely used at conferences and seminars. For example, the Metropolis style (\usetheme{metropolis}) is suitable for scientific presentations.

Working with Lists

When formatting lists, you can use the enumitem package, which allows you to customize numbering and indentation in detail:

```
\begin{enumerate}[label=\arabic*., itemsep=5pt]
\item First item of the list;
\item Second item of the list;
\item Third item of the list.
\end{enumerate}
```

LaTeX styles are used to control the formatting and structure of documents in a flexible and efficient way. They allow you to define and apply specific formatting rules for various elements, such as fonts, headings, lists, and tables, ensuring consistency and high-quality output.

Here are some key uses of LaTeX styles:

Customization: You can define your own style settings (fonts, colors, indentation, etc.) to match the specific requirements of your document or publication.

Consistency: Using styles ensures that the entire document follows a uniform structure, which is especially useful in academic and technical writing.

Reusability: Once a style is created, it can be reused in multiple documents, saving time and effort when formatting new documents.

Document Typesetting: LaTeX provides predefined document styles (like article, book, report, etc.) for different types of writing. These styles automate layout and formatting to suit specific needs.

Professional Formatting: LaTeX allows for precise formatting, especially useful for complex documents like scientific papers, where you may need to manage figures, tables, equations, references, and more.

Collaboration: LaTeX styles help maintain consistency in collaborative projects, ensuring that everyone involved in writing or editing the document follows the same format Figure 1.

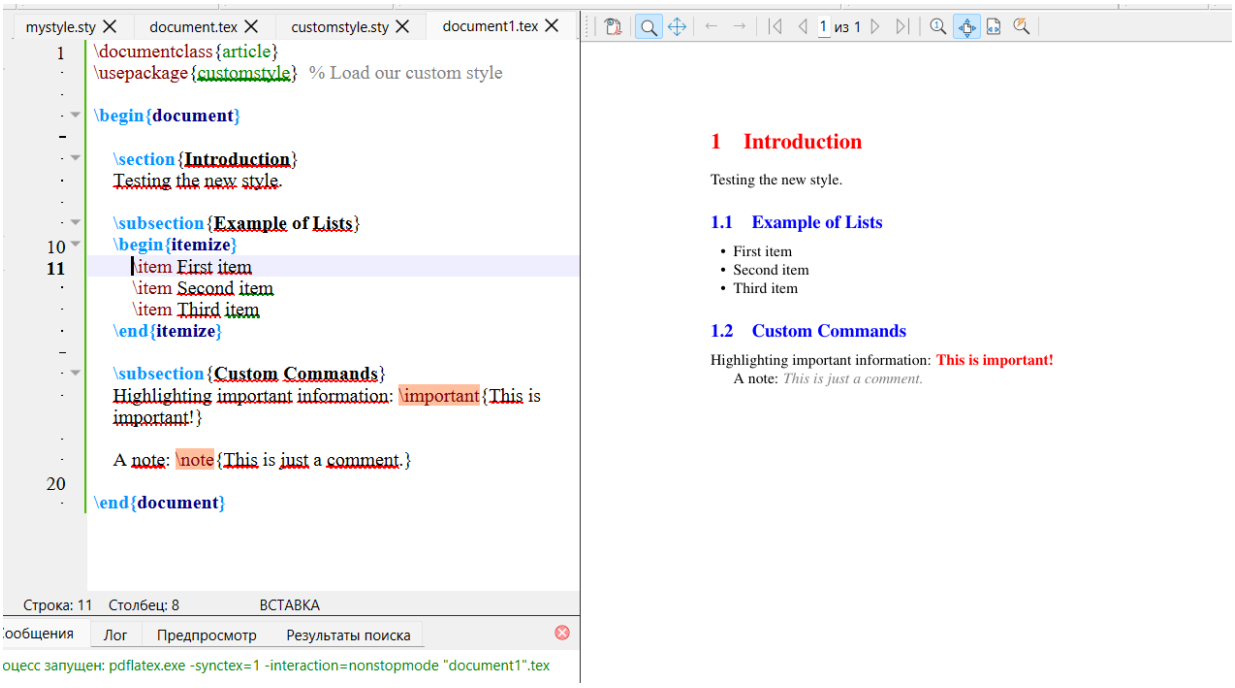

Figure 1. Connecting the style customstyle.sty to the document

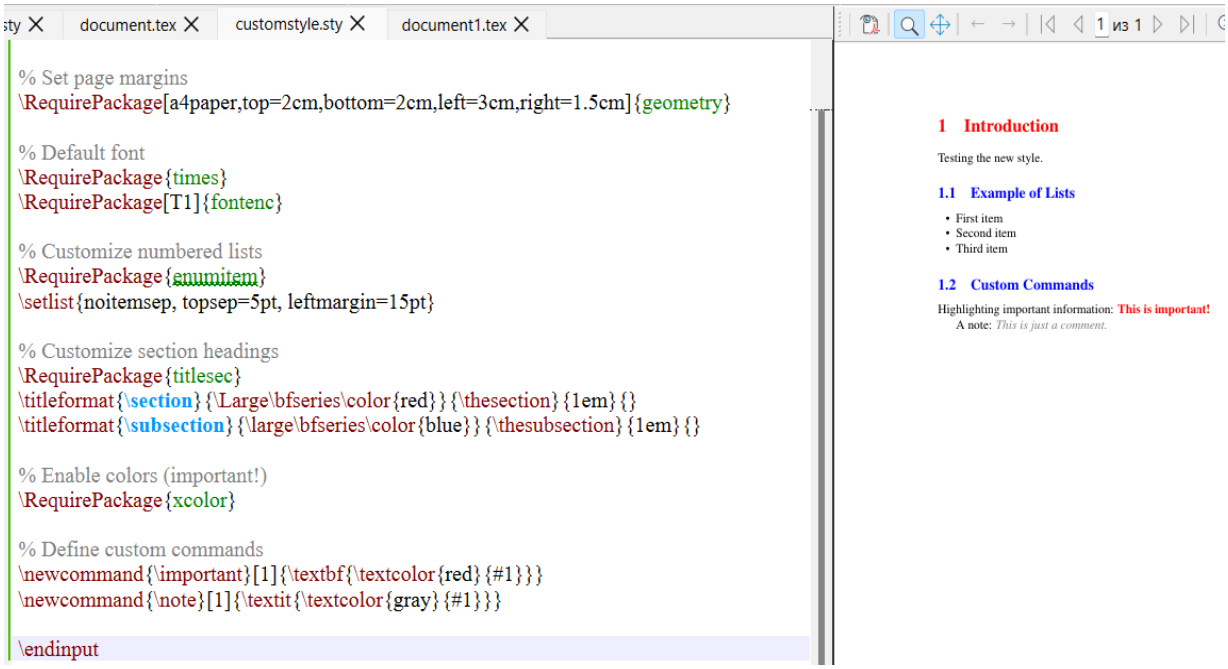

Figure 2. Custom Style Configuration in LaTeX

The left side shows the code of the files customstyle.sty and document.tex.

- The customstyle.sty file contains formatting settings, including changes to header colors, lists, and the definition of custom commands (\important{} and \note{}).
- The document.tex file uses this style, creating a document with sections "Introduction," "Example of Lists," and "Custom Commands."

The right side shows the compiled PDF file.

- The \section headers are displayed in red, while \subsection headers are in blue.
- The list items (itemize) are correctly formatted.

- The custom commands work: \important{} highlights text in red bold, and \note{} makes it gray and italic.

The customstyle.sty file is correctly configured, and LaTeX applies the custom style without errors.

Conclusion

The results demonstrate that LaTeX offers exceptional control over document aesthetics, especially through modular use of classes and packages. Predefined document classes provide solid foundations for formatting, while customization with packages enables fine-tuning of headers, margins, typography, and section layout. Custom style files proved effective in standardizing institutional or publication-specific formatting across multiple documents. Notably, automation of citations, cross-referencing, and table of contents generation improved efficiency and reduced formatting errors. The comparative analysis revealed that while classes like IEEEtran are rigid but publication-ready, flexible classes like memoir support deep customization.

The use of styles and packages in LaTeX significantly improves document formatting, automates routine tasks, and enhances code readability. Creating custom styles allows users to tailor LaTeX to their individual needs. Additionally, working with tables, lists, and graphics makes documents more professional and readable.

Thanks to the wide range of packages and settings, LaTeX provides powerful tools for preparing scientific papers, educational materials, and presentations. A deeper study of LaTeX allows users to maximize its functionality, ensuring high-quality formatting and ease of use.

Styling in LaTeX is more than a cosmetic tool—it is a core feature that enhances the structure, clarity, and professionalism of technical documents. The ability to define and reuse styles streamlines document creation and ensures compliance with academic and editorial standards. While the learning curve can be steep for beginners, the long-term benefits in productivity and document quality are substantial. This review underlines the importance of mastering LaTeX styling for researchers, engineers, and students engaged in high-standard documentation tasks. Future work may focus on integrating LaTeX styles with collaborative tools and AI-driven editors to further simplify the process.

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