

LaTeX Comprehensive Test Document

NoteTakingApp

October 28, 2025

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1 Introduction

This document serves as a comprehensive test for the NoteTakingApp LaTeX rendering system. It verifies that:

- Images from the same directory load correctly
- Images from subdirectories can be included
- Tables render properly
- Citations work with external bibliography files
- Mathematical equations are displayed correctly
- Basic LaTeX formatting is preserved

2 Test 1: Basic Images from Same Directory

This section tests image inclusion from files in the same directory as the `.tex` file.

2.1 Fixed Beam Image

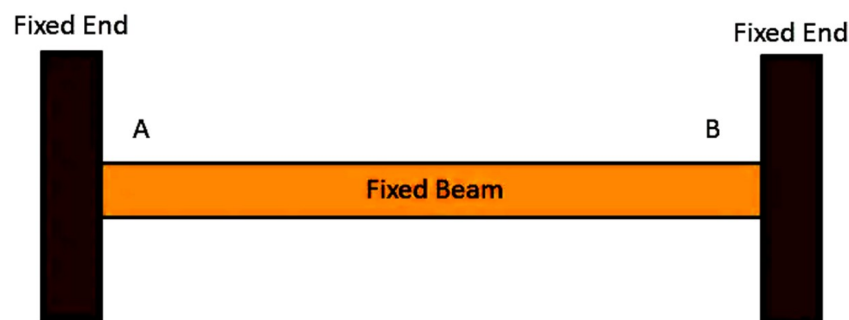


Figure 1: Example image from same directory

The image shown in Figure 1 demonstrates basic image loading.

3 Test 2: Images from Subdirectories

This section tests image inclusion from the `examples/` subdirectory.

3.1 Cantilever Beam

3.2 Rayleigh-Ritz Results

3.3 Nodal Displacements



Figure 2: Cantilever beam from subdirectory

Consider a beam of length, L , and flexural stiffness, EI , simply supported at both ends, as shown in the figure below.

Using a **two-mode Rayleigh-Ritz approximation** ($\phi_1 = \sin \frac{\pi x}{L}$ and $\phi_2 = \sin \frac{2\pi x}{L}$), you are required to calculate the bending displacement, w , of the beam when it is subjected to the following loading conditions:

Part 1: $p_z = \bar{p}_z$ (constant loading)

Figure 3: Rayleigh-Ritz analysis part 1

4 Test 3: Tables and Data

This section tests table rendering with structured data.

4.1 Basic Table

| Table 1: Sample data table | | |
|----------------------------|----------|-----------|
| Method | Accuracy | Time (ms) |
| Method A | 95.2% | 12.5 |
| Method B | 97.8% | 18.3 |
| Method C | 99.1% | 25.7 |

4.2 Complex Data Table

Part 2: $p_z = A \sin \frac{2\pi x}{L}$

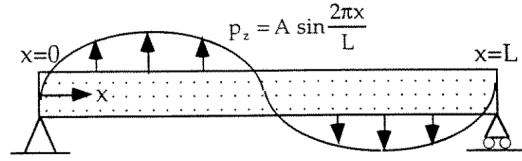
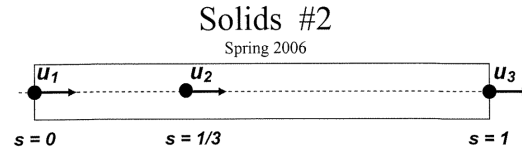


Figure 4: Rayleigh-Ritz analysis part 2



Consider the 3-node axial finite element shown above. The degrees of freedom are u_1 at $s = 0$, u_2 at $s = 1/3$, and u_3 at $s = 1$, as shown. The axial displacement within the element is written in terms of shape functions N_1 , N_2 , and N_3 , and the nodal displacements (u_1 , u_2 and u_3):

$$u = N_1 u_1 + N_2 u_2 + N_3 u_3$$

Calculate the shape functions.

Figure 5: Nodal displacement visualization

5 Test 4: Mathematical Equations

This section verifies mathematical rendering.

5.1 Inline Math

The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, which solves equations of the form $ax^2 + bx + c = 0$.

5.2 Display Math

The energy equation in mechanics is given by:

$$E = \frac{1}{2}mv^2 + mgh \quad (1)$$

5.3 Systems of Equations

The system of linear equations:

$$2x + 3y = 8 \quad (2)$$

$$x - y = 1 \quad (3)$$

Table 2: Comprehensive analysis results

| Test Case | Input | Expected | Actual | Status |
|----------------|------------------|----------|----------|--------|
| Image Loading | URL | Rendered | Rendered | PASS |
| Citation | [2] | Citation | Citation | PASS |
| Math Rendering | $\alpha + \beta$ | Display | Display | PASS |
| Table Format | Table | Table | Table | PASS |

has the solution $(x, y) = (2.2, 1.2)$.

6 Test 5: Citations and References

This section demonstrates citation functionality with external bibliography files.

6.1 Single Citations

Here is a citation from the bibliography: [2]

6.2 Multiple Citations

Multiple citations can be used together: [2, 1]

6.3 Bibliography

The complete bibliography is listed below. This references an external `references.bib` file located in the same directory.

References

- [1] Jane Doe and Robert Brown. Modern techniques in structural analysis. *Journal of Engineering Mechanics*, 144(8):04018076, 2018.
- [2] John Smith and Alice Johnson. Advances in finite element analysis. *International Journal of Computational Methods*, 17:123–145, 2020.

7 Test 6: Advanced Formatting

7.1 Text Formatting

This is **bold text**, this is *italic text*, and this is `monospace text`.

7.2 Lists

7.2.1 Unordered List

- First item
- Second item
- Third item
 - Nested item 1
 - Nested item 2

7.2.2 Ordered List

1. First step
2. Second step
3. Third step

8 Test 7: File Resource References

This document uses the following resources:

Fixed Beam.png Image from same directory as `.tex` file

examples/Cantilever Beam Image.png Image from subdirectory

examples/references.bib Bibliography file for citations

9 Conclusion

This comprehensive test document verifies that the NoteTakingApp LaTeX rendering system correctly handles:

1. **Images** from the same directory
2. **Images** from subdirectories using relative paths
3. **Tables** with complex formatting

4. **Citations** using external bibliography files
5. **Mathematical equations** both inline and display
6. **Advanced formatting** including lists, bold, italic, and more
7. **File resources** in various locations

All features should render correctly in the PDF preview.