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# **sphinxcontrib-katex**

***Release v0.9.5***

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# CHAPTER 1

---

## Installation

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To install `sphinxcontrib.katex` into your Python virtual environment run:

```
$ pip install sphinxcontrib-katex
```

If you want to pre-render the math by running Javascript on your server instead of running it in the browsers of the users, you have to install [nodejs](#).



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### Usage

---

In `conf.py` of your Sphinx project, add the extension with:

```
extensions = ['sphinxcontrib.katex']
```

For enable server side pre-rendering add in addition (`nodejs` installation needed):

```
katex_prerender = True
```

See the Configuration section for all available settings.





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Configuration

---

The behavior of `sphinxcontrib.katex` can be changed by configuration entries in `conf.py` of your documentation project. In the following all configuration entries are listed and their default values are shown.

```
katex_css_path = \
    'https://cdn.jsdelivr.net/npm/katex@0.16.7/dist/katex.min.css'
katex_js_path = 'katex.min.js'
katex_autorender_path = 'auto-render.min.js'
katex_inline = [r'\(', r'\)']
katex_display = [r'\[', r'\]']
katex_prerender = False
katex_options = ''
```

The specific delimiters written to HTML when math mode is encountered are controlled by the two lists `katex_inline` and `katex_display`.

If `katex_prerender` is set to `True` the equations will be pre-rendered on the server and loading of the page in the browser will be faster. On your server you must have a `katex` executable installed and in your `PATH` as described in the Installation section.

The string variable `katex_options` allows you to change all available official [KaTeX rendering options](#), e.g.

```
katex_options = r'''{
    displayMode: true,
    macros: {
        "\\RR": "\\mathbb{R}"
    }
}'''
```

You can also add [KaTeX auto-rendering options](#) to `katex_options`, but be aware that the `delimiters` entry should contain the entries of `katex_inline` and `katex_display`.



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## LaTeX Macros

---

Most probably you want to add some of your LaTeX math commands for the rendering. In KaTeX this is supported by LaTeX macros (`\def`). You can use the `katex_options` configuration setting to add those:

```
katex_options = r'''macros: {
    "\\i": "\\mathrm{i}",
    "\\e": "\\mathrm{e}^{#1}",
    "\\vec": "\\mathbf{#1}",
    "\\x": "\\vec{x}",
    "\\d": "\\operatorname{d}\\!",
    "\\dirac": "\\operatorname{\\delta}\\left(#1\\right)",
    "\\scalarprod": "\\left\\langle#1,#2\\right\\rangle",
}'''
```

The disadvantage of this option is that those macros will be only available in the HTML based [Sphinx builders](#). If you want to use them in the LaTeX based builders as well you have to add them as the `latex_macros` setting in your `conf.py` and specify them using proper LaTeX syntax. Afterwards you can include them via the `sphinxcontrib.katex.latex_defs_to_katex_macros` function into `katex_options` and add them to the LaTeX preamble:

```
import sphinxcontrib.katex as katex

latex_macros = r"""
    \def \i          {\mathrm{i}}
    \def \e          #1{\mathrm{e}^{#1}}
    \def \vec        #1{\mathbf{#1}}
    \def \x          {\vec{x}}
    \def \d          {\operatorname{d}\!}
    \def \dirac      #1{\operatorname{\\delta}\\left(#1\\right)}
    \def \scalarprod #1#2{\left\\langle#1,#2\\right\\rangle}
"""

# Translate LaTeX macros to KaTeX and add to options for HTML builder
katex_macros = katex.latex_defs_to_katex_macros(latex_macros)
katex_options = 'macros: {' + katex_macros + '}'

# Add LaTeX macros for LATEX builder
latex_elements = {'preamble': latex_macros}
```



---

## Math Rendering Examples

---

The examples start always with a code box showing the commands, which is followed by the resulting Sphinx output.

### 5.1 Inline math

Some inline math `:math:`x_1 + x_2 + ... + x_n, n \in \mathbb{Z}``, followed by text.

Some inline math  $x_1 + x_2 + ... + x_n, n \in \mathbb{Z}$ , followed by text.

### 5.2 Macros

You can define macros directly in your math directive.

```
.. math::

\def \x {\mathbf{x}}
\def \w {\omega}
\def \d {\operatorname{d}\!}

P(\x,\w) = \oint_{\partial V} D(\x_0,\w) G(\x-\x_0,\w) \d A(\x_0)
```

$$P(\mathbf{x}, \omega) = \oint_{\partial V} D(\mathbf{x}_0, \omega) G(\mathbf{x} - \mathbf{x}_0, \omega) dA(\mathbf{x}_0)$$

If you want to use them in the whole document, the best is to define them in `conf.py` as part of the `katex_options`, see [LaTeX Macros](#). Afterwards, you can use them in every math directive.

## 5.3 Aligned environment

```
.. math::
```

```
\begin{aligned}
\dot{x} &= \sigma(y-x) \\
\dot{y} &= \rho x - y - xz \\
\dot{z} &= -\beta z + xy
\end{aligned}
```

$$\begin{aligned}\dot{x} &= \sigma(y-x) \\ \dot{y} &= \rho x - y - xz \\ \dot{z} &= -\beta z + xy\end{aligned}$$

## 5.4 Array environment

```
.. math::
```

```
\begin{array}{c:c:c:c:c:c}
\Gamma & \Delta & \Theta & \Lambda & \Xi & \Pi \\
\gamma & \delta & \theta & \lambda & \xi & \pi
\end{array}
```

$$\begin{array}{c:c:c:c:c:c} \Gamma & \Delta & \Theta & \Lambda & \Xi & \Pi \\ \gamma & \delta & \theta & \lambda & \xi & \pi \end{array}$$

## 5.5 Case definitions

```
.. math::
```

```
f(n) = \begin{cases}
\frac{n}{2}, & \text{if } n \text{ is even} \\
3n+1, & \text{if } n \text{ is odd}
\end{cases}
```

$$f(n) = \begin{cases} \frac{n}{2}, & \text{if } n \text{ is even} \\ 3n+1, & \text{if } n \text{ is odd} \end{cases}$$

## 5.6 Matrices

A simple matrix defined with the `pmatrix` environment:

```
.. math::
```

```
\begin{pmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23} \\
a_{31} & a_{32} & a_{33}
\end{pmatrix}
```

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

The `pmatrix*` environment is not available, but you can use the `array` environment for more complex matrices:

```

.. math::

\def \msum {-\textstyle\sum}
\def \psum {\phantom{-}\textstyle\sum}
I_{ik} = \left(
\begin{array}{lll}
\psum m (y^2+z^2) & \msum m x y & \msum m x z \\
\msum m y x & \psum m (x^2+z^2) & \msum m y z \\
\msum m z x & \msum m z y & \psum m (x^2 + y^2)
\end{array}
\right)
\right)

```

$$I_{ik} = \left( \begin{array}{lll} \sum m(y^2 + z^2) & -\sum mxy & -\sum mxz \\ -\sum myx & \sum m(x^2 + z^2) & -\sum myz \\ -\sum mzx & -\sum mzy & \sum m(x^2 + y^2) \end{array} \right)$$

## 5.7 Equation numbers

Some of Maxwell's equations are given in (5.1), (5.2), and (5.3).

```

.. math::
:label: gauss-law

\nabla \cdot \mathbf{E} = 4 \pi \rho

.. math::
:label: gauss-law-magnetism

\nabla \cdot \mathbf{B} = 0

.. math::
:label: maxwell-faraday-equation

\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}

```

$$\nabla \cdot \mathbf{E} = 4\pi\rho \quad (5.1)$$

$$\nabla \cdot \mathbf{B} = 0 \quad (5.2)$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \quad (5.3)$$

## 5.8 Fraction

```

.. math::

1 - 2 \phi_{i,j} = \frac{4 N^{AA,aa}_{i,j} + N^{Aa}_{i,j} + N^{Aa}_{j,i} - 2 N^{Aa,Aa}_{i,j}}{\sum_{s \in S_{i,j}} 4 p_s (1 - p_s)}

```

$$1 - 2\phi_{i,j} = \frac{4N_{i,j}^{AA,aa} + N_i^{Aa} + N_j^{Aa} - 2N_{i,j}^{Aa,Aa}}{\sum_{s \in S_{i,j}} 4p_s(1 - p_s)}$$





If you find errors, omissions, inconsistencies or other things that need improvement, please create an issue or a pull request at <https://github.com/hagenw/sphinxcontrib-katex/>. Contributions are always welcome!

## 6.1 Development Installation

Instead of pip-installing the latest release from PyPI, you should get the newest development version from [Github](#):

```
git clone https://github.com/hagenw/sphinxcontrib-katex.git
cd sphinxcontrib-katex
# Create virtual environment
pip install -r requirements.txt
```

This way, your installation always stays up-to-date, even if you pull new changes from the Github repository.

## 6.2 Coding Convention

We follow the [PEP8](#) convention for Python code and check for correct syntax with [flake8](#). Exceptions are defined under the `[flake8]` section in `setup.cfg`.

The checks are executed in the CI using [pre-commit](#). You can enable those checks locally by executing:

```
pip install pre-commit # consider system wide installation
pre-commit install
pre-commit run --all-files
```

Afterwards [flake8](#) is executed every time you create a commit.

You can also install [flake8](#) and call it directly:

```
pip install flake8 # consider system wide installation
flake8
```

It can be restricted to specific folders:

```
flake8 audfoo/ tests/
```

## 6.3 Building the Documentation

If you make changes to the documentation, you can re-create the HTML pages using [Sphinx](#). You can install it and a few other necessary packages with:

```
pip install -r docs/requirements.txt
```

To create the HTML pages, use:

```
python -m sphinx docs/ build/sphinx/ -b html
```

The generated files will be available in the directory `build/sphinx/`.

It is also possible to automatically check if all links are still valid:

```
python -m sphinx docs/ build/sphinx/ -b linkcheck
```

## 6.4 Running Tests

`sphinxcontrib.katex` is supposed to work for all versions `sphinx>=1.6`. To test that you have to use a stripped down version of the documentation that is provided in the `tests/` folder, as the documentation under `docs/` uses features that are only supported by `sphinx>=1.8`.

To test that everything works as expected, please execute:

```
python -m sphinx tests/ tests/_build/ -c docs/ -b html -W
python -m sphinx tests/ tests/_build/ -c docs/ -b latex -W
```

The same tests are automatically performed by [Travis](#) once you create a pull request on [Github](#).

## 6.5 Updating to a new KaTeX version

`sphinxcontrib.katex` is bond to fixed KaTeX versions. To update the package to a new KaTeX version, execute:

```
bash update-katex-version.sh
```

and commit the resulting changes.

## 6.6 Creating a New Release

New releases are made using the following steps:

1. Bump version number in `sphinxcontrib/katex.py`
2. Update `CHANGELOG.rst`
3. Commit those changes as “Release X.Y.Z”
4. Create an (annotated) tag with `git tag -a vX.Y.Z`
5. Push the commit and the tag to Github
6. Check that the new release was built correctly on [RTD](#), delete the “stable” version and select the new release as default version

All notable changes to this project will be documented in this file.

The format is based on [Keep a Changelog](#), and this project adheres to [Semantic Versioning](#).

### 7.1 Version 0.9.5 (2023-06-07)

- Changed: use KaTeX 0.16.7
- Fixed: convert `KaTeXServer.timeout_error()` to class method

### 7.2 Version 0.9.4 (2023-01-04)

- Changed: use KaTeX 0.16.4

### 7.3 Version 0.9.3 (2022-11-25)

- Changed: reverted enforcement of 100% font scale as a larger scaling of 1.21em is the expected KaTeX default behavior

### 7.4 Version 0.9.2 (2022-11-25)

- Fixed: update Python package version number

### 7.5 Version 0.9.1 (2022-11-25)

- Added: support for Python 3.11
- Changed: use KaTeX 0.16.3
- Changed: enforce 100% of document font-size for HTML

## 7.6 Version 0.9.0 (2022-08-19)

- Added: local KaTeX server to dramatically speed up pre-rendering
- Added: `katex.min.js` and `auto-render.min.js` are now included in the Python package
- Added: support for Python 3.10
- Changed: use KaTeX 0.16.0
- Removed: support for Python 3.6

## 7.7 Version 0.8.6 (2021-05-27)

- Fixed: allow to work with Sphinx $\geq$ 4.0.0

## 7.8 Version 0.8.5 (2021-05-26)

- Fixed: remove extra space after inline math when using pre-rendering

## 7.9 Version 0.8.4 (2021-05-18)

- Changed: increase top padding of equations by 2px

## 7.10 Version 0.8.3 (2021-05-18)

- Fixed: building of documentation on RTD

## 7.11 Version 0.8.2 (2021-05-18)

- Fixed: PyPI package version number

## 7.12 Version 0.8.1 (2021-05-18)

- Fixed: PyPI package had wrong version number

## 7.13 Version 0.8.0 (2021-05-18)

- Added: support for Python 3.9
- Added: support for Sphinx $\geq$ 4.0.0
- Added: tests for Windows and macOS
- Changed: switch to KaTeX 0.13.11
- Changed: switched CI tests from Travis to Github Actions
- Changed: running sphinx will now fail in pre-render mode if KaTeX fails
- Removed: support for Python 2.7, 3.4, 3.5

## 7.14 Version 0.7.2 (2021-04-28)

- Fixed: Sphinx  $\geq 4.0.0$  is not supported at the moment

## 7.15 Version 0.7.1 (2020-10-29)

- Fixed: label of fraction example in docs

## 7.16 Version 0.7.0 (2020-10-29)

- Added: fraction example to docs
- Changed: switch to KaTeX 0.12.0
- Changed: add small top and bottom padding to equations

## 7.17 Version 0.6.1 (2020-05-25)

- Fixed: run katex under Windows

## 7.18 Version 0.6.0 (2020-02-13)

- Changed: switch to Katex 0.11.1
- Changed: add tests for Python 3.7 and 3.8

## 7.19 Version 0.5.1 (2019-08-13)

- Added: equation numbers in documentation (#16)
- Changed: subset of tests for sphinx  $\leq 1.6$  (#23)
- Changed: several improvements to documentation

## 7.20 Version 0.5.0 (2019-07-25)

- Added: katex server side pre-rendering (#15)
- Changed: switch to Katex 0.10.2 (#17)
- Removed: deprecated Sphinx `setup_math` (#10)

## 7.21 Version 0.4.1 (2019-01-08)

- Fixed: macros example in documentation

## 7.22 Version 0.4.0 (2018-12-14)

- Added: Sphinx documentation and setup RTD page
- Added: Travis-CI tests
- Changed: KaTeX version 0.10.0
- Changed: make compatible with `sphinx>=1.6`
- Removed: configuration option `katex_version`

## 7.23 Version 0.3.1 (2018-10-08)

- Fixed: incompatibility with `sphinx>=1.8` (#8)

## 7.24 Version 0.3.0 (2018-09-06)

- Added: allow for user defined autorendering delimiters (#7)
- Fixed: bug if `katex_options` was blank (#5)

## 7.25 Version 0.2.0 (2018-06-22)

- Added: document all configuration settings
- Added: automatic setting of delimiters for KaTeX auto-renderer
- Removed: `katex_macros` option

## 7.26 Version 0.1.6 (2018-04-12)

- Added: equation numbering across pages with `sphinx>=1.7`
- Changed: KaTeX version 0.9.0

## 7.27 Version 0.1.5 (2017-12-19)

- Added: helper function to convert LaTeX defs to KaTeX macros
- Changed: improvement of code readability
- Fixed: mouse over for equation numbers in Firefox

## 7.28 Version 0.1.4 (2017-11-27)

- Changed: move equation numbers to the right and center vertically

## 7.29 Version 0.1 (2017-11-24)

- Added: initial release