pympdata 1.3.2

Latest version

```
pip install pympdata
```

Released: Mar 10, 2025

Numba-accelerated Pythonic implementation of MPDATA with examples in Python, Julia, Rust and Matlab

Verified details

These details have been verified by PyPI

Project links

Documentation

Source

Tracker

GitHub Statistics

Repository

Stars: 27

Forks: 17

Open issues: 13

Open PRs: 10

Maintainers

AgnieszkaZaba

prbartman

slayoo

Unverified details

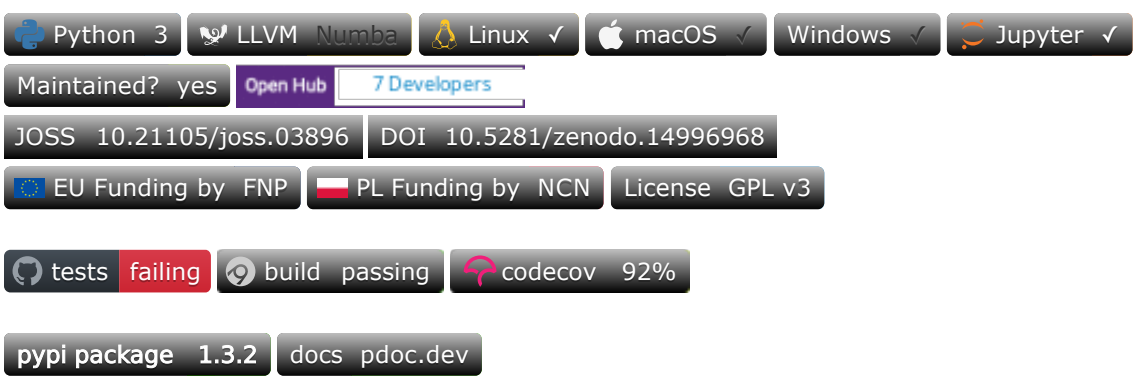
*These details have **not** been verified by PyPI*

Meta

- **License:** GNU General Public License v3 (GPLv3)

Project description

PyMPDATA



PyMPDATA is a high-performance Numba-accelerated Pythonic implementation of the MPDATA algorithm of Smolarkiewicz et al. used in geophysical fluid dynamics and beyond for numerically solving generalised convection-diffusion PDEs in 1D, 2D and 3D structured meshes with coordinate transformations.

In short, PyMPDATA numerically solves the following equation:

$$\partial_t(G\psi) + \nabla \cdot (Gu\psi) + \mu\Delta(G\psi) = 0$$

where scalar field ψ is referred to as the advectee, vector field u is referred to as advector, and the G factor corresponds to optional coordinate transformation. The inclusion of the Fickian diffusion term is optional and is realised through modification of the advective velocity field with MPDATA handling both the advection and diffusion (for discussion see, e.g. Smolarkiewicz and Margolin 1998, sec. 3.5, par. 4).

PyMPDATA documentation is generated via `pdoc`.

A separate project called `PyMPDATA-MPI` depicts how `numba-mpi` can be used to enable distributed memory parallelism in PyMPDATA.applications, and provide a validation of the implementation and its performance.

Dependencies and installation

To install PyMPDATA, one may use: `pip install PyMPDATA` (or `pip install git+https://github.com/open-atmos/PyMPDATA.git` to get updates beyond the latest release). PyMPDATA depends on `NumPy` and `Numba`.