

# ***Interactive comment on “libmpdata++ 0.1: a library of parallel MPDATA solvers for systems of generalised transport equations” by A. Jaruga et al.***

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## **General comments**

- The manuscript introduces a new scientific library, libmpdata++, which can solve systems of generic transport equations using various formulations and extensions of the MPDATA solution method. Each solver in the library is verified and validated using a set of well-documented benchmarks.
- Overall the manuscript is well-written. The library and its interfaces are described in sufficient detail to potentially allow new users to set-up and run their own sim-

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ulations with the code. The source code itself is readily obtainable, and I was able to compile the code and run several of the examples with relative ease. I believe that the manuscript would be suitable for publication in Geoscientific Model Development after some minor changes have been made.

## Specific comments

- There are many flags and options mentioned throughout the paper, such as “tot”, “fct”, “nug”, etc. I occasionally had to go back and remind myself of what these stood for, so having a table of reference (in an Appendix) which collects them all together (with shortened descriptions) would be a useful addition.
- Please provide details about the hardware that each example was run on, and their typical run-times, for the benefit of new users wishing to reproduce these simulations.
- Page 8183, line 2: Providing a few examples of such potential advanced applications here may help to attract users from other fields and widen the audience.
- Page 8183, line 4: Please clarify whether the “current snapshot” provided as a Supplement is the same as the v0.1 release that the manuscript introduces, or whether it is a more recent ‘bleeding edge’ development version. If possible, I would also suggest that a release ‘tag’ be made in the project’s GitHub repository (<https://github.com/igfuw/libmpdataxx/releases>) for reference.
- I was able to configure and compile libmpdata++ on my computer. However, in addition to the Blitz++ library, I also had to install HDF5 and gnuplot in order to do this successfully. Please add these two dependencies to Section 2.1 (page 8183, line 6). Furthermore, provide details about the platforms that libmpdata++ supports (e.g. can it only be run on Unix-based systems?).

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- Page 8192, line 22: The name “hello world” is a bit misleading. I recommend renaming this example to something like “minimal/basic example” or “Advection of the Witch of Agnesi curve”. The same applies to line 19, page 8194.
- Page 8208, line 1: Why is this default value for `vip_eps` not used later on, on page 8209 line 18? Does a value less than  $1e-8$  cause numerical stability issues in that example? Please comment.
- Page 8212, line 13: Define what **g** is and give its value.
- Please place line 3, page 8215 under a new section called “Code availability”, as per the requirements for a Model Description paper ([http://www.geoscientific-model-development.net/submission/manuscript\\_types.html](http://www.geoscientific-model-development.net/submission/manuscript_types.html)). Also, state here the license under which libmpdata++ is released.
- Page 8258, listing 19: Please add a comment (either in the main text or as a C++ comment) that confirms/clarifies that the variable “omg” represents  $\omega$  here. Alternatively, consider changing the variable’s name to “omega” to be consistent with “p.omega” seen later.

## Technical corrections

- Page 8180, line 1: “accompanies first release” -> “accompanies **the** first release”.
- Page 8182, line 22: “with definition of” -> “with **a** definition of”.
- Page 8182, line 25: “one that follow” -> “one that **follows**”.
- Page 8187, footnote 12: “multe” -> “multi”.
- Page 8193, line 4: “means of transported field” -> “means of **the** transported field”.

- Page 8194, line 26: “index of equation” -> “index of **the** equation”.
- Page 8201, line 11: “greater or equal 0.5” -> “greater **than** or equal **to** 0.5”.
- Page 8208, line 1: “equal 1” -> “equal **to** 1”.
- Page 8212, line 1: “as time-varying velocity” -> “as **the** time-varying velocity”.
- Page 8212, line 9: “featuring elliptic” -> “featuring **an** elliptic”.
- Page 8248, listing 10 caption: Space needed: “andvelocity” -> “and velocity”.

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Interactive comment on Geosci. Model Dev. Discuss., 7, 8179, 2014.

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