

Hydrol. Earth Syst. Sci. Discuss., community comment CC1  
<https://doi.org/10.5194/hess-2022-153-CC1>, 2022  
© Author(s) 2022. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## Comment on hess-2022-153

Thomas Graf

---

Community comment on "A robust upwind mixed hybrid finite element method for transport in variably saturated porous media" by Anis Younes et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-153-CC1>, 2022

---

This manuscript introduces a new upwind Mixed Finite Element (MFE) method to solve for solute transport under saturated and unsaturated conditions. The new scheme is shown to avoid unphysical oscillations that is otherwise potentially caused by advection.

The manuscript is clearly written, and the mathematical context is sound and complete. The two illustrative results are useful and demonstrate very well the capabilities of the new method.

There are some minor comments that I ask the authors to address:

1. There are a number of filling words (especially "indeed") that need to be removed. It is also uncommon to use "the" in e.g. line 129 when generally addressing water content etc.
2. Description of boundary conditions of the two examples in section 4. is not complete. Both figures 4 and 7 should show all BCs for both flow and transport. As is, this is not the case and must be changed. Also, the text does not give the full description of all BCs for both flow and transport, which also has to be completed. A figure that shows the meshes for both examples is missing and would be very helpful. I understand it is an unstructured mesh which explains the fact that result in Fig. 5 is not symmetric. This should be mentioned. For simplicity, it would have been more efficient to use only the upper half of the domain due to symmetry reasons. The authors should give a reason why they did not do so.