September 19, 2024

To the Editor of the SIAM Journal on Applied Mathematics –

Please consider this manuscript for publication in SIAP. This is an original submission, though a preprint has been posted at arxiv.org/abs/2408.06470.

The content here is somewhere in the convex hull of SIAP, SISC, and SINUM. I believe that it is closest to SIAP, but I am happy to accept editorial guidance on this.

Here is my reasoning for choosing SIAP. On the one hand, the most original theorem is actually Theorem 6.3, new and general finite element quasi-optimality result for variational inequalities (VIs), and its glacier-specific corollary Theorem 7.2. On the other hand, and more compelling regarding journal placement in my view, the most original *content* is the new weak-form mathematical model for glacier evolution using non-shallow dynamics, namely VI (3.23) and the associated operator definition. I make rigorous progress on the new model, but with well-posedness based on conjectural elements, something I make very clear.

There are relatively few mathematical glaciologists out there, but here are some referee suggestions, listed alphabetically, supposing it is appropriate:

> Josefin Ahlkrona, Stockholm University, Sweden, ahlkrona@math.su.se
> Ian Hewitt, Oxford University, UK, hewitt@maths.ox.ac.uk
> Guillaume Jouvet, University of Lausanne, Switzerland, guillaume.jouvet@unil.ch
> Christian Schoof, University of British Columbia, Canada, cschoof@eoas.ubc.ca
> Dan Shapero, University of Washington, shapero@uw.edu

Only one of these, Jouvet, is a former co-author, but it has been a while.

Researchers with an interest in other VI and/or Stokes models are also in the target audience. The VI here is very different from most literature because its operator requires the solution of a separate PDE problem (i.e. evaluation of the surface trace from a Stokes solution). I have made every effort in the manuscript to make this novel structure as clear as possible, which accounts for the manuscript length.

Best regards, and appreciatively,

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