

Treatment of Grounding Line Migration for Efficient Paleo-ice Sheet Simulations

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Abstract

The full Stokes (FS) model for palaeo-ice sheet simulations have previously been highly impractical due to the high computational cost. One way to lower this cost is to use approximations such as the Shallow Shelf Approximation (SSA) and/or the Shallow Ice Approximation (SIA), possibly coupling such approximations in some regions with FS in others. In order to capture the important grounding line migration a FS model is required in a region around the grounding line.

We propose and implement a new sub-grid method for grounding line migration in a FS model with constant mesh. The beauty of this work is to avoid remeshing when the grounding line moves in the computational mesh. A new boundary condition is introduced to accommodate the discontinuity in the physical and numerical model. The method is implemented in Elmer/ICE using the finite element method. We will present convergence results of the sub-grid method as the mesh is refined.

References

1. G. CHENG AND P. LÖTSTEDT AND L. VON SYDOW. Efficient numerical ice-sheet simulations over long time spans. Draft report.