

Iterative solver for ice models

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The momentum equation for ice models are nonlinear partial differential equations, called p-Stokes equations (or in application Full Stokes equations). Classically the Picard iteration is used, which is regarding to use in practice globally convergent, but slow. We consider damped Newton methods to get faster convergence and to prove local convergence for a slightly different equation. (We add $\mu_0 (\nabla v, \nabla \phi)$ to be able to calculate the next iteration.)

In a second step we show global convergence with a Trust-Region method.

At the end we compare a Picard iteration and a Newton iteration with Armijo step-size rule with respect to number of iterations and effort for a mathematical test problem.