1071-65-88 **Wei Leng**, **Lili Ju*** (ju@math.sc.edu), **Max Gunzburger**, **Stephen Price** and **Todd Ringler**. *A Parallel High-Order Accurate Finite Element Nonlinear Stokes Ice-Sheet Model and Benchmark Experiments.* Preliminary report.

A parallel finite element implementation on tetrahedral grids of the nonlinear three-dimensional nonlinear Stokes model for the dynamics of ice-sheets is presented. Discretization is based on a high-order accurate scheme using the Taylor-Hood element pair. Both no-slip and sliding boundary conditions at the ice-bedrock boundary are studied. In addition, effective solvers using preconditioning techniques for the saddle-point system resulting from the discretization are discussed and implemented. We demonstrate through established ice-sheet benchmark experiments that our finite element nonlinear Stokes model performs at least as well as other published and established Stokes models in the field, and the parallel solver is shown to be efficient, robust, and scalable. (Received February 22, 2011)