1086-65-465   **Abner J Salgado*** (`abnersg@math.umd.edu`), Department of Mathematics, University of Maryland, College Park, MD 20742. *A PDE approach to fractional difussion: a priori and a posteriori error analysis.* Preliminary report.

We study solution techniques for problems involving fractional powers of the Dirichlet Laplace operator in a bounded domain. This operator can be realized as the Dirichlet to Neumann operator of a degenerate/singular elliptic problem posed on a semi-infinite cylinder, which we analyze in the framework of weighted Sobolev spaces. Motivated by the rapid decay of the solution of this problem, we propose a truncation that is suitable for numerical approximation. We discretize this truncation using first degree tensor product finite elements. We provide a priori error estimates for shape regular and optimal error estimates using anisotropic elements in weighted Sobolev spaces. A posteriori error estimation techniques are discussed and analyzed. To illustrate the method's performance we present numerical experiments. (Received September 03, 2012)