1086-35-1592 **Christine S Hoffman** (hoffm621@morris.umn.edu), 950 County Road 88 SW, Alexandria, MN 56308, **Amanda Brucker*** (abrucker14@cornellcollege.edu), #1030 810 Commons Circle, Mount Vernon, IA 52314, and **Joshua Bracewell** (jb83@njit.edu) and **Trevor Vossberg** (tvossber@hawk.iit.edu). *Nonlocal Models in Diffusion with Applications in Peridynamics.* Preliminary report.

Our work presents some nonlocal diffusion models connected with the new theory of peridynamics (introduced by Silling). Peridynamics is an alternative to continuum mechanics that allows us to model phenomena involving material discontinuities. We show connections between classical differential operators and their nonlocal counterparts, obtaining convergence results for the solutions from different points of view. We derive nonlinear diffusion equations in the nonlocal framework of peridynamics, following the ideas of Bobaru and Duangpanya. For the case when the conductivity is time dependent we derive a fundamental solution for the nonlocal problems and prove exponential decay rates by using energy methods and a nonlocal version of the Poincaré's inequality. The numerical simulations presented show estimates for the solution in the nonlinear case as well as in the case of time dependent conductivity.

(Received September 23, 2012)