1082-35-307 **Clarissa C. Garvey*** (ccg9648@rit.edu) and **Nathan D. Cahill**. *Nonrigid Registration of 3D Medical Images using Fractional Partial Differential Equations.*

Image registration is used in medical imaging to compare images of the same structure that are captured at different times, with different modalities, or both. In clinical situations where the structure is deformed, nonrigid image registration can be performed by solving an inhomogeneous diffusion equation. Recent research proposed the use of a fractional diffusion equation (FDE) for solving the nonrigid registration problem. However, the research used simplistic assumptions in its methods for numerically solving the FDE. This research uses standard discretizations of the fractional Laplacian operator combined with Fourier transformation based approaches to efficiently solve the FDE. The resulting process was implemented in MATLAB and incorporated into an existing nonrigid image registration program. The algorithm was validated using 3D magnetic resonance breast images. (Received July 10, 2012)