1009-35-186 **John B Greer*** (greer@cims.nyu.edu), Courant Institute, 251 Mercer Street, New York, NY 10012, and **Andrea L Bertozzi** and **Guillermo Sapiro**. *Numerically solving PDEs on Implicit Surfaces.*

We will examine recent methods for solving PDEs defined on codimension-one surfaces in R^N. By using geometric tools from level set methods (see Sethian, 2000, or Osher and Fedkiw, 2003), we compute PDEs on these curved domains using only finite difference schemes and standard Cartesian grids in the embedding space. In addition to being easy to implement, the methods are readily adaptable to problems where the surface evolves by some external velocity field. These methods suffer the disadvantage of being defined on a larger domain – a small band around the curve or surface. In addition, well-behaved PDEs like the heat equation become degenerate diffusions when computed in the ambient space. We will discuss current work in this area, including an application of this method to fourth order equations on surfaces. The Cahn-Hilliard equation and a model for a thin film of fluid driven down a sphere by gravity are among the examples discussed. We also present a newer formulation of these level set methods that avoids the degeneracy problems mentioned above. (Received August 15, 2005)