1051-35-34 **Myles Baker*** (myles_baker@baylor.edu), One Bear Place #81135, Waco, TX 76798, and **Sarah Farell** (sf457@bard.edu). *An Adaptively Weighted Least-Squares Finite Element Method for Convection Dominated Diffusion PDEs.* Preliminary report.

Convection-dominated partial differential equations give rise to error as a by-product of approximation, which is difficult to resolve using quantitative solution methods. Due to the nature of computational methods for solving PDEs, cost-efficiency is important; boundary layers of elliptical PDEs cause solutions of the least-squares approach to be overly smoothed and our goal is to improve the least-squares method by using an adaptive weight approach in the most computationally effective way. We develop a new adaptively weighted least-squares finite element method that works in conjunction with adaptive mesh refinement to balance error in approximations. This method also allows us to improve solutions in terms of both accuracy and computational cost. We use FreeFem++ to illustrate how our adaptive weighted methods affect approximated solutions to convection-dominated diffusion PDEs. We extend this method by applying it to various test problems and the Navier-Stokes equations. (Received July 27, 2009)