1056-65-1973   **Christopher M Kuster*** (`ckuster@carrollu.edu`), Department of Mathematics, Carroll University, 100 N East Ave, Waukesha, WI 53186. *An optimization-based approach to discretizing the eikonal equation.*

In numerical methods such as the Fast Marching Method, the eikonal equation ($|\nabla \phi| = 1$) is solved using a finite differences approach. The solution to this equation is the minimum distance to the given boundary. In this presentation, the standard first and second order discretizations are matched with equivalent minimization problems. In addition, a new method is proposed to solving the eikonal equation with a non-constant slowness function ($|\nabla \phi| = F(x)$). This method treats $F(x)$ as a piecewise quadratic function instead of the standard piecewise constant. (Received September 22, 2009)