1024-65-67 **J. Thomas Beale*** (beale@math.duke.edu), Mathematics Department, Duke University, Box 90320, Durham, NC 27708. *Estimates for Finite Difference Approximations to Problems with Interfaces.*

When a problem is formulated as a partial differential equation it is convenient to find solutions numerically at points on a regular rectangular grid. However, the region of interest is often irregular or changing in time. Some numerical methods try to retain the simplicity of rectangular grids by making special corrections at the boundary. Methods of this type have been introduced by A. Mayo, R. LeVeque, Z. Li and others, for problems with interfaces, e.g., transmission through media with different properties or the motion of two fluids. We will present error analysis of these methods for steady problems using discrete versions of familiar estimates for elliptic partial differential equations. For a Poisson problem with an interface, with grid spacing h, the error in the solution can be uniformly of order h^2 even if the truncation error in the problem near the interface is of order h. We explain the reason for this gain. A few applications will be discussed. This work is joint with A. Layton. (Received December 26, 2006)