1096-90-1846 **Rick Chartrand*** (`rickc@lanl.gov`), Theoretical Division, MS B284, Los Alamos National Laboratory, Los Alamos, NM 87545. *Generalized shrinkage and penalty functions.*

A key ingredient in many algorithms for ℓ^1 minimization is that the solution of an ℓ^1-penalized least squares problem (in other words, the *proximal mapping* of the ℓ^1 norm) has a simple, explicit solution, given by the mapping known as soft thresholding. The fact that the solutions to many ℓ^1 problems are sparse is related to the way soft thresholding acts to shrink the magnitudes of components. These properties of the ℓ^1 norm are sufficiently useful that in this talk, we construct new penalty functions by first specifying a shrinkage function, and then seeking the penalty function having it as a proximal mapping. By imposing conditions on our shrinkage function, we can guarantee that the resulting penalty function has desirable properties for producing sparse solutions. We will show examples of this process, including a new penalty function that leads to image reconstruction from fewer measurements than ever before. (Received September 16, 2013)