Meeting: 1005, Newark, Delaware, SS 2A, Special Session on Singular Analysis and Spectral Theory of Partial Differential Equations

1005-35-70 **Gregory C Verchota*** (gverchot@syr.edu), 215 Carnegie, Syracuse University, Syracuse, NY 13244. *Uniqueness and counter examples to uniqueness for the Lp oblique derivative problem.*

The oblique derivative problem for harmonic functions is formulated with respect to a continuous transverse unit vector field defined on the boundary of a bounded Lipschitz domain that has connected boundary. Data is prescribed in Lebesgue spaces on the boundary with respect to surface measure. Data is taken on almost everywhere with respect to surface measure by way of nontangential convergence. Solutions are taken from the class of harmonic functions with nontangential maximal function of the gradient in the Lebesgue space. This is the setup of a 1985 theorem of A. P. Calderon's that uses certain nonclassical layer potentials to solve the problem in L2 modulo a finite number of linear conditions. In the plane for L2 data solutions are shown to be unique up to constant solutions so that the number of linear conditions is in fact one. The same can be shown in higher dimensions as long as the vector field is Holder continuous. For $p<2$ explicit curvilinear polygons and vector fields are constructed that possess any given number of explicit solutions with zero a.e. data. A Lipschitz domain is constructed with an infinite number of such solutions. Consequences for the potentials follow. (Received January 27, 2005)