1022-35-16 **Stephen J O'Dell*** (sodell@math.ucla.edu), Department of Mathematics, UCLA, Los Angeles, CA 90095-1555. *Direct and inverse scattering for penetrable obstacles with general transmission conditions.* Preliminary report.

We consider direct and inverse scattering problems for penetrable obstacles with general transmission conditions (i.e. interior boundary conditions). At the boundary of the obstacle the solution u must satisfy the transmission conditions

$$\begin{pmatrix} u_- \\ (\frac{\partial u}{\partial \nu})_- \end{pmatrix} = \begin{pmatrix} a(x) & b(x) \\ c(x) & d(x) \end{pmatrix} \begin{pmatrix} u_+ \\ (\frac{\partial u}{\partial \nu})_+ \end{pmatrix}$$

for smooth functions a, b, c, and d. Also, we assume there may be electric potentials on the interior and exterior. We find sufficient conditions to guarantee solvability of the direct problem and, assuming the exterior potentials are known, show that the fixed energy scattering data uniquely determine the shape and location of the obstacle, the transmission conditions, as well as the Dirichlet-to-Neumann operator at the surface of the obstacle. These results can be extended to allow for anisotropic media and electromagnetic potentials on the interior and exterior. To prove the uniqueness, we analyze the behavior of the singularity of the Green's function near the boundary of the obstacle. (Received August 17, 2006)