1020-35-17 **Stephen O'Dell*** (sodell@math.ucla.edu), Department of Mathematics, UCLA, Los Angeles, CA 90095-1555. *Scattering for transmission obstacles with variable matrix interfaces.* Preliminary report.

I will consider the transmission boundary value problem with variable matrix interfaces, i.e.

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

These boundary conditions physically arise as imperfect interfaces in acoustic scattering and are known as transfer matrix heterojunctions in the study of semiconductors. I will study direct and inverse scattering problems for these transmission obstacles. In particular, I find sufficient conditions to guarantee self-adjointness of the direct problem and will also show that the fixed energy scattering amplitude uniquely determines the location of the obstacle, the boundary conditions, and the Dirichlet-to-Neumann operator at the surface of the obstacle (even in the non-self-adjoint case). The Dirichlet-to-Neumann operator is useful when there are unknown interior potentials and/or media. (Received June 29, 2006)