Title: Layered medium Green's functions for wave scattering problems  
  
Abstract:  
  
A classical problem in acoustic and electromagnetic scattering concerns   
the evaluation of the Green's function for the Helmholtz or Maxwell   
equations in layered media. Existing methods are typically based on the   
Sommerfeld integral and the method of complex images. The former is   
extremely efficient when the source is far from any interface, but   
involves an unwieldy range of integration as the source gets closer and   
closer. Complex image-based methods, on the other hand, can be quite   
efficient when the source is close to the boundary, but require   
substantial precomputation for each source/target pair. We have   
developed a new  representation for the Green's function which combines   
physical layer potentials over a finite region and Sommerfeld-like   
integrals. It is insensitive to the location of the source and target,   
efficient, robust, and automatic. This is joint work with Jun Lai and   
Mike O'Neil.