1014-35-1527 **Donald J Kouri*** (kouri@uh.edu), Department of Physics, University of Houston, Houston, TX 77204 5005. *New Approaches to the Acoustic Wave Equation.* Preliminary report.

We present several new approaches to the full acoustic wave equation. The exact solution is written using an exponentiated operator. This is expanded in terms of the so-called "regional" or Faber polynomials. The approach avoids the use of finite differences in the time and takes advantage of the analyticity of the exponential. Convergence of the expansion is ensured by means of a conformal mapping technique. The operator is unbounded in the acoustic scattering case, and truncated approximations are used to reduce the formal solution to one amenable to solution on digital computers. Several representations of the operator are studied. First, we approximate the identity using wavelets derived by a constrained minimization of the Heisenberg uncertainty product. They are optimally confined in the physical and Fourier domains. Second, we employ new, "isotropic multiresolution analysis" wavelets. In this case, radially symmetric wavelets admitting the use of fast transforms (in any number of dimensions) are employed. These also are well confined in the physical and Fourier domains. In both cases, highly banded representations of the relevant operator are generated, optimizing the algorithm efficiency. (Received September 28, 2005)