1086-39-1814 **Ani P. Velo*** (avelo@sandiego.edu), Department of Mathematics & Computer Science, University of San Diego, 5998 Alcala Park, San Diego, CA 92110, and **George A. Gazonas** (george.a.gazonas.civ@mail.mil), US Army Research Laboratory, Weapons and Materials Research Directorate, Aberdeen Proving Grd, MD 21005. *Stress wave propagation in one-dimensional Goupillaud-type layered elastic media with applications to optimization, resonance and impact problems.*

We consider a one-dimensional layered Goupillaud-type elastic medium (equal wave travel time for each layer), subjected to a discrete forcing function or other impact conditions at one end and held fixed or free at the other end. A first-order system of difference equations describes the exact values of the stress terms in the discrete model. Further analysis of the system using z-transform methods provides insight to optimal designs that minimize the stress amplitude when the discrete forcing function is the Heaviside loading. When the discrete forcing function is sinusoidal and varies harmonically with time, the resonance frequency spectrum is described analytically. Finally, in selected impact problems, the stress and velocity limit values related to the (steady) long term behavior of the system are predicted analytically. A key aspect of this work is that it provides exact solutions and analytical results for verification of computational codes used to solve large scale problems. (Received September 24, 2012)