Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Reflection of Various Types of Waves by Layered Media SERGIY MOKHOV, BORIS ZELDOVICH, College of Optics and Photonics / CREOL, UCF — The one-dimensional wave equation describing propagation and reflection of waves in a layered medium is transformed into an exact first-order system for the amplitudes of coupled counter-propagating waves. Any choice of such amplitudes, out of continuous multitude of them, allows one to get an accurate numerical solution of the reflection problem. We discuss relative advantages of particular choices of amplitude. We also introduce the notion of reflection strength S of a plane wave by a nonabsorbing layer, which is related to the reflection intensity R by $R = \tanh^2 S$. We show that the total reflection strength by a sequence of elements is bounded above by the sum of the constituent strengths, and bounded below by their difference. Reflection strength is discussed for propagating acoustic waves and quantum mechanical waves. We show that the standard Fresnel reflection may be understood in terms of the variable S as a sum or difference of two contributions, one due to a discontinuity in impedance and the other due to a speed discontinuity.

Sergiy Mokhov
College of Optics and Photonics / CREOL, UCF

Date submitted: 21 Nov 2008 Electronic form version 1.4