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Reflectionless low-frequency seismic wave propagation in the "Reference Earth Model"

E. Pelinovsky (1), E. Pasternak (2), A. Dyskin (3), and B. Gurevich (4)

(1) Applied Physics Institute, Department of Nonlinear Geophysical Processes, Nizhny Novgorod, Russian Federation (pelinovsky@hydro.appl.sci-nnov.ru, 007 8314 365976), (2) School of Mechanical and Chemical Engineering, University of Western Australia, Perth, Australia, (3) School of Civil and Resource Engineering, University of Western Australia, Perth, Australia, (4) 4) Department of Exploration Geophysics, Curtin University, Perth, Australia

Scattering of seismic body waves in inhomogeneous media provides important information about properties and characteristics of the earth interior. In some cases, the observed scattering is weaker than expected. This is usually explained by the anomalously large attenuation of seismic waves due to absorption. Here we suggest another mechanism to explain the weak scattering of low-frequency seismic waves. This mechanism is associated with existence of "non-reflective" layers where the waves can propagate with no reflection. There are many such reflectionless profiles in the density and wave speed. We demonstrate this phenomenon for a number of examples such as Reference Earth Model (Dziewonski and Anderson, 1981) and shallow marine sediments (Hamilton, 1979). The phenomenon is analogous to non-reflected wave propagation in the basins of variable depth.