Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXIX, págs. 4075-4075 (resumen)
Eduardo Dvorkin, Marcela Goldschmit, Mario Storti (Eds.)
Buenos Aires, Argentina, 15-18 Noviembre 2010

THE HILBERT TRANSFORM AND ITS APPLICATION FOR THE STUDY OF THE SEISMIC WAVE'S ATTENUATION AND DISPERSION

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Abstract. Because of the attenuation of the seismic waves propagating in anelastic materials, the wave energy becomes heat, producing a decrease in the wave amplitude and modifying the wave phase.
The attenuation process depends of the characteristics of the medium such as: porosity, density of the fractures, the kind of fluid fills the pores between others. Also, the attenuation of the seismic waves generally is represented to be inversely related with the quality factor which is denoted by Q.
This presentation focuses in the application to the relation between phase velocity and the attenuation, in order to study the loss mechanism of energy of the wave. This can be done through the Hilbert transform which is a lineal operator over causal and analytics functions.
We will show an application based in the relations that arise from some hypothesis such as a dependency between Q with the frequency, the assumption that attenuation is a linear process and the dependency relation between c (phase velocity) with the frequency. Also, we will discuss a contradiction can occur when those relations are used simultaneously.
That is, within the physics context, there will be energy in a special point before the pulse meets the mentioned point.
The final result of this project is represented by the Kramers Kronig's dispersion relation which is a generalization of the dispersive relation for elastic waves.