

ACOUSTICS2008/2782 Interaction of elastic waves with dislocations

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This work concerns the effective propagation of elastic waves in a medium filled with randomly placed dislocations. Multiple scattering theory is applied to derive the effective velocity and attenuation of the waves (both transverse and longitudinal) because of the effect of the dislocations. Our work is a generalization of Granato & Lucke theory since it takes into account the polarization of the elastic waves.

Two principal results have been obtained, in connexion with experiments: 1) we have explained the different attenuations experimentally measured between longitudinal and transverse waves. The difference between the two values is obtained in quantitative agreement with no adjustable parameter.

2) we have offered a scenario for the frequency law in the attenuation measured in polycrystals (a combination of quadratic and quartic law). This has been done by taking into account the dislocations at the grain boundaries that can contribute to the attenuation process.