EVOLUTION OF DIFFUSE ELASTIC WAVE FIELDS IN HETEROGENEOUS SLABS

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Fundamental studies of elastic wave scattering in heterogeneous media are applicable for problems at several length scales from ultrasonic to seismic waves. The intermediate scattering regime that lies between the single scattering and the diffusion limits is perhaps the least understood. In this presentation, both the steady-state and time dependent scattering problems are examined for this regime within the context of the coupled radiative transfer equations (RTE) that govern this problem. The focus here is on slab geometries for which the scattering medium lies between two parallel boundaries separated by a distance investigated over a range from several to tens of mean free paths. The spatial distribution, temporal evolution, and partitioning of the diffuse longitudinal and shear energies are studied as a function of direction and frequency for several types of microstructure including polycrystalline metals, concrete, porous media, and geophysical media. The longitudinal and shear flux reflected from and transmitted through the slab are also discussed due to their importance for experimental materials characterization. Finally, the ability of a diffusion-type solution to fit RTE solutions is also discussed with applications to inversion of experimental results. The results are anticipated to provide insight on this important intermediate scattering regime. [Work supported by US DOE]

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