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A geometric representation of the Green's functions for scattering in layered media

We consider the response G(t) at the boundary of a layered half-space to a normally incident impulsive plane wave. This serves as a basic model for measured data in various imaging modalities, where one seeks to determine physical parameters of the half-space from the data. From the mathematical perspective, G is the partial Green's function for a PDE having discontinuous coefficients, and it has been extensively analyzed by stochastic methods. The purpose of this talk is to give a new, deterministic description of G in terms of a system of PDE on the polydisk crossed with the torus. Remarkably, the latter system has smooth coefficients and reveals some unexpectedly simple geometry.