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Reflection and transmission coefficients of a fluid slab-like region containing a depth-varying random distribution of cylinders

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This work deals with multiple scattering by a random distribution of parallel elastic cylinders immersed in a fluid slab-like region. The concentration of scatterers inside the slab is supposed to vary slowly with depth, and the WKB method is used to calculate the reflection and transmission coefficients of the slab. In order to do so, the continuity conditions on the boundaries between the slab and the surrounding fluid are needed. They follow from the application of Twersky's theory to the case of a slab with a given constant concentration of scatterers, which shows that both pressure and normal displacement are continuous, provided an effective mass density of the slab is correctly defined. The results of the WKB are successfully compared to those obtained from the discretization of the slab into layers of constant concentrations of cylinders and the use of Twersky's theory.