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deduction of porous material properties using a point source

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The acoustic field created by a point source above the plane boundary between two semi-infinite fluid layers has been previously studied by Brekhovskikh. A straightforward generalization can be performed by replacing the fluid under the source by the fluid equivalent to a rigid-framed porous medium. This leads to a method of evaluating, from pressure measurements, the surface impedance close to grazing incidence and the Brewster angle of total refraction of the porous medium. The model by Brekhovskikh can also be generalized when a thin porous layer is set under the point source. A pole of the reflection coefficient exists for an angle of incidence close to grazing incidence. This pole is related to an acoustic field similar to a surface wave above the layer. The measurement of this angle provides an evaluation of the surface impedance close to grazing incidence. The point source induces frame vibrations that can be predicted with the Biot theory. The rigidity coefficients of the frame at audible frequencies can be evaluated from measurements of the frame velocity with a laser velocimeter.