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TITLE:

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Velocities of longitudinal waves in terrigenous sediments

PERIODICAL:

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Akademiya nauk SSSR. Izvestiya. Seriya geofizicheskaya, no. 8, 1962,

pp. 1009-1024,

TEXT: The velocities of longitudinal waves calculated for ideally elastic discrete media (the size and the shape of the grains obey the normal distribution, and the interstices are filled with a fluid) as functions of the physical properties of the components (Young modulus, elasticity, velocity of longitudinal waves) and of volume interrelationships of the components (porosity) were applied to several terrigenous sediments with the following results: the highest velocities and velocity gradients dV/dz correspond to cemented sands, whereas the lowest - to clay. Pure sands are characterized by intermediate values. The intervals of V and dV/dz values overlap for all these rocks. In sandy loams with 35 to 55% sand the $V(z)$ curve may change the sign of its curvature. The results are at variance with the proposition of Gassman et al. (Ref. 1: Elastic waves through a packing of spheres, Geoph., 16, no. 4, 1951) that the

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Velocities of longitudinal waves...

velocity increases with the depth as \sqrt{z} . The calculated $V(z)$ curves are in agreement with the factual data for various sediments. The probable theoretical functions $V=V(z)$ and $V=V(\varphi)$, where φ porosity, can be used in rough estimates of V and dV/dz from known lithological constitution of soils, in determination of rock properties from results of acoustic sounding, in extrapolation of the experimental $V(z)$ and $V(\varphi)$ curves and also in the resolution of the $V(x,y,z)$ field into components contributed by various factors. There are 8 figures.

SUBMITTED:

December 6, 1961

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