THE MECHANISM OF PORE PRESSURE GENERATION IN SATURATED SOILS DUE TO EXPLOSIONS

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The effect of pore pressure generation and liquefaction of saturated soils due to explosions is studied theoretically by consideration of plastic waves producing soil compaction. Although the water is considered as imcompressible, density changes of the grain skeleton are allowed for, as is common practice in the theory of interacting continua. Taking into account the continuity equation a simple expression for the pore pressure generation is derived, The propagation velocity of the waves, as influenced by the pore water flow according to Darcy's law, exhibits dispersion and is found to be less than for dry soil. It decreases with decreasing permeability, thus explaining why soils of very low permeability (e.g. clays) are not prone to liquefaction.

The physical model presented here departs from the known quasistatic explanations of pore pressure generation, which seem to be inappropriate for transient loadings, neither it uses the notion of elastic waves. Note that the quasistatic models for pore pressure generation, though quite acceptable for slow loading, do not take account of the permeability of the considered soil, Further, the elastic waves do not change, by definition, the soil structure, i.e. they do not compact the soil.