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PARTICULAR ASPECTS OF APPLICABILITY OF PROVISIONS OF THE PHYSICAL AND CHEMICAL THEORY OF EFFECTIVE STRESSES TO SANDY SOILS

The authors consider several aspects of applicability of the new approach to formation of effective stresses in soils in relation to sands, as it was set out in the theory developed by academician V.I. Osipov. The analysis of several genetic types of quaternary sands, performed by the authors, makes it possible to use the number of contacts to identify the morphology of sand grains within the framework of the analysis of soils.

The authors demonstrate that the employment of the formulas developed by academician V.I. Osipov in the calculation of the number of contacts between particles in natural sandy soils is virtually impossible due to the fact that no natural sand particles can boast an ideal spherical shape. The number of contacts between the sand particles may increase due to the defects of their shape and the nature of the particle surface.

In this study, the shape and nature of the surface of sand grains represent those of the sands of various origins. The authors have employed a composite index of morphology that takes account of the shape and nature of the surface throughout the amount of sand under research. Similar calculations that take account of the morphology of grains were performed for selected fractions of sands to eliminate the influence of grain size on the packing of sands.

The analysis of provisions of the physical and chemical theory of effective stresses of soils and the study of multiple types of natural sands demonstrate that further research of formation and phases of coagulation contacts between particles of soil requires a detailed study of structural features of sands. These structural features include the grain size, homogeneity, the shape and nature of the surface of sand grains.

Both individual particles of sand and sandy soil are to be subjected to morphological assessments. The parameters to be assessed will include density and composition of sandy soils, as the soil porosity affects the formation of true contacts between particles of sand and determines their number. Mineral composition is an important factor affecting the shape and nature of the surface of sand grains. The research performed by the authors contemplates the study of the morphology of monogene, polyminer, oligomictic and polimytic sands. However quartz is the principal mineral in the structure of sand under research. Further research will cover other minerals to obtain more information about the formation of contacts between sand grains.

Key words: physical and chemical theory, effective voltage, sandy soil, sand particles, contacts, number of grains, porosity, field, grain morphology, surface area, sand fraction.

References


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