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Adjustments shown in the measurement of pressure gauges PRESSURE IN SOIL pneumatic PRESIOMETRAMY

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In the article the method by which you can more accurately select the air pressure in the pneumatic chamber presiometra when measuring pressure in the soil.

Tension presiometr, deformation.

Problem. Presiometry widely used in evaluating the deformation properties of soils in the walls of boreholes to measure movements in the soil during the construction of buildings and structures, as well as soil testing static loads to determine their elastic properties.

Analysis of the Latest Research. Known as the design of hydraulic and pneumatic presiometriv. The main elements of the pneumatic working presiometra is bladder (Fig. 1), which is supplied compressed air, and 2 gauge for measuring air pressure.

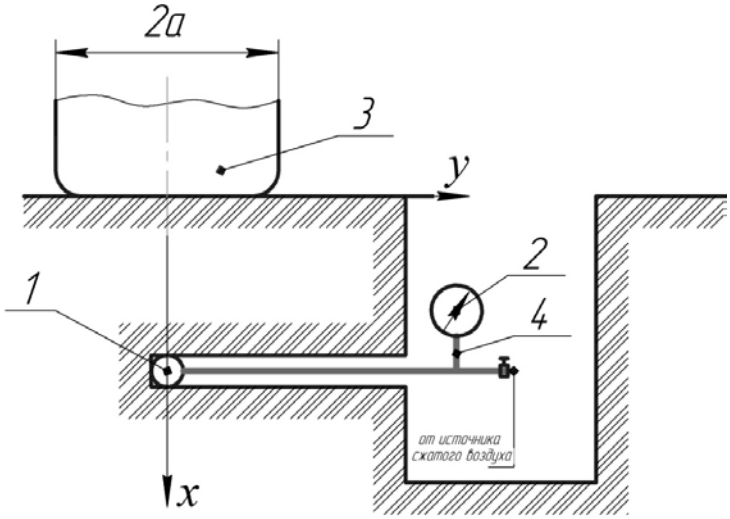

Fig. 1. Scheme of pressure in the soil.

The purpose of research is to study the characteristics of measuring stress in soil using pneumatic presiometra and rational selection pressure in the air chamber device.

Results. In our case it was necessary to measure the pressure at different points of the array ground under 3 wheel vehicle to verify the theoretical results obtained in the course of [2]. The feature of this experiment is the smallness of the measured pressure (about one hundredth fate MPa), while the indicators gauge impact air trapped in the connecting hoses 4. In this regard indicators gauge pressure not responsible for soil air chamber, so there was a need for adjustment these indicators.

Changing the air pressure in the system and its volume in this case small, so the temperature remains almost constant. This so-called isothermal process in which the gas pressure on its volume can be considered constant [4]. Let - the volume of air in the chamber, which is measured by the pressure of the soil, and - the volume of air hoses that with sufficient stiffness their remains unchanged.$V_1 V_2$

Consider two cases.

1. Camera isolated and pressure it varies from the original, created in the system by means of a compressed gas source to the measured pressure p, which occurs at running wheels on the investigated point. Reducing the amount of $\Delta p_0 V$ camera we find the condition:

$$p_0 V_1 = p(V_1 - \Delta V) \text{Where.} \Delta V = V_1 \frac{p - p_0}{p}$$

2. For the whole system can be written:

$$p_0(V_1 + V_2) = p_M(V_1 - \Delta V + V_2),$$

where - indicators gauge; - Extent air hoses.$p_M V_2$

Excluding the last equation ΔV, We obtain the formula for converting a valid indicators gauge the pressure:p

$$k = \frac{p}{p_M} = \frac{1}{1+\alpha(1-\frac{p_M}{p_0})} \text{Where.} \alpha = \frac{V_2}{V_1}$$

With a large volume of bladder and short hoses impact air hoses little and when.$\alpha \to 0,\ p = p_M$

If it is necessary to measure the pressure at certain points nonuniform stress of the soil, the volume of the chamber should be minimal as possible. Then he becomes close to the volume of air hoses and there is a need for adjustment gauge performance.

Fig. 2 graphs ratio depending on the ratio for different values. They cover all practical cases. In addition, these graphs to get information for the correct choice of initial pressure so that in some ways no relationship was too large for the range of expected performance gauge.$k p_M / p_0\ \alpha p_0, \alpha k = p / p_M p_M$

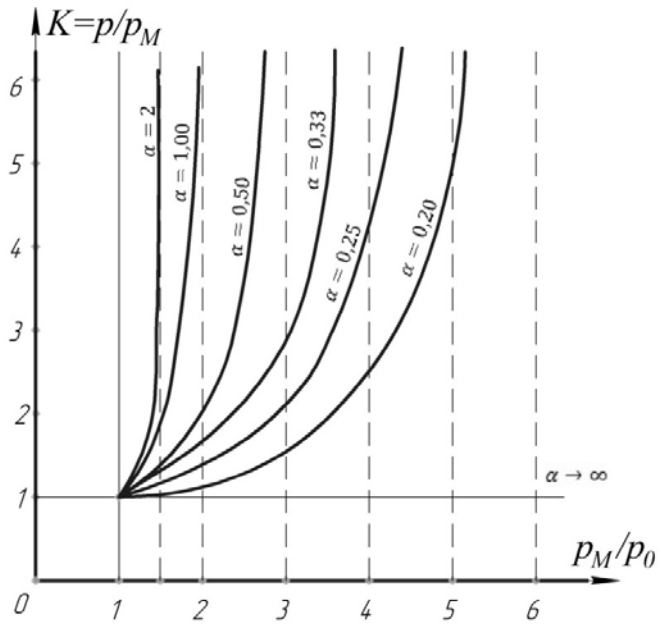

Fig. 2. The schedule change.$k = k(p_M/p_0)$

In our case, the ratio of the volume of air hoses and Broadcaster with their actual values. Average measured tension created in the soil tractor: $\alpha = 1 V_1 = V_2 = 34{,}0$ см$^3 p_{\text{ср}1} = p_1 - p_0;\ p_{\text{ср}2} = p_2 - p_0$.

Theoretical stress was determined according to the method presented in [2] for the calculated stresses and (z-axis in Fig. 1 is perpendicular to the plane of the drawing) must multiply the ratio of the corresponding strain is shown in Fig. 3 specific pressure between the tractor wheel and the surface of the soil.$\sigma_x, \sigma_y \sigma_z$

As you know, the complete deformation element elastic medium consists of changing the shape of the element and change its size. The latter is proportional to the average of three mutually perpendicular stresses:

$$\sigma_{\text{ср}} = \frac{\sigma_x + \sigma_y + \sigma_z}{3},$$

and that is the pressure at this point.

The results of measurements and calculations are summarized in Table. 1. Theoretical value, and average stress is given for the case of static load, ie with the engine switched off the tractor.$\sigma_x \sigma_y \sigma_z \sigma_{\text{ср}}$

1. The value of the measured pressure in the soil (MPa).

x	p_0	p_{M1}	p_{M2}	p_1	p_2	$p_{\text{cp}1}$	$p_{\text{cp}2}$	σ_x	σ_y	σ_z	σ_{cp}	p_M/p_0
0,5a	.110	0,132	.129	.165	0.156	0,055	0,046	0,076	0,036	0,028	0.047	1.173
a	.113	0.128	0,125	.148	.140	0,035	0,027	0,065	0,015	0.020	0,033	1.106
1,5a	.114	0,123	0,123	.134	.134	0.020	0.020	0,054	0,006	0,015	0,025	1.079
2a	.110	.116	.116	0,123	0,123	0,013	0,013	0,044	0,003	0,012	0.020	1.055
2.5a	.114	0,115	0,115	.116	.116	0,002	0,002	0,037	0,002	0,009	0,016	1,409
0,5a	.111	0.133	0,130	.166	0.157	0,055	0,046	0.072	0,031	0,026	0.043	1.17
a	.110	0.124	.122	0,142	0,137	0,032	0,027	.059	0,015	.0184	.0308	1,109
1,5a	.113	0,123	0,121	.135	0,130	0,022	0,017	.049	0,008	0,014	0,024	1,071
2a	.110	0,115	.114	0.120	.118	0.01	0,008	0,041	0,004	0,011	0.019	1,036
2.5a	.112	.113	.113	.114	.114	0,002	0,002	0,035	.0026	0,009	.0155	1,009
0,5a	.111	0,125	0,123	0,143	.138	0,032	0,027	0.04	0,028	0,017	0,028	1.108
a	.113	0,123	.122	0.133	.134	0.02	0,021	0,038	0,018	0,014	0,023	1.08
1,5a	.112	0.120	.118	.129	0.13	0,017	0,018	0,036	0,011	0,012	0.02	1,054
2a	.110	.117	0,115	0,125	0,123	0,015	0,013	0,033	0,007	0.01	0,017	1.05
2.5a	.110	0,115	.114	0.120	.122	0.01	0,012	0.03	0,005	0,009	0,015	1,036

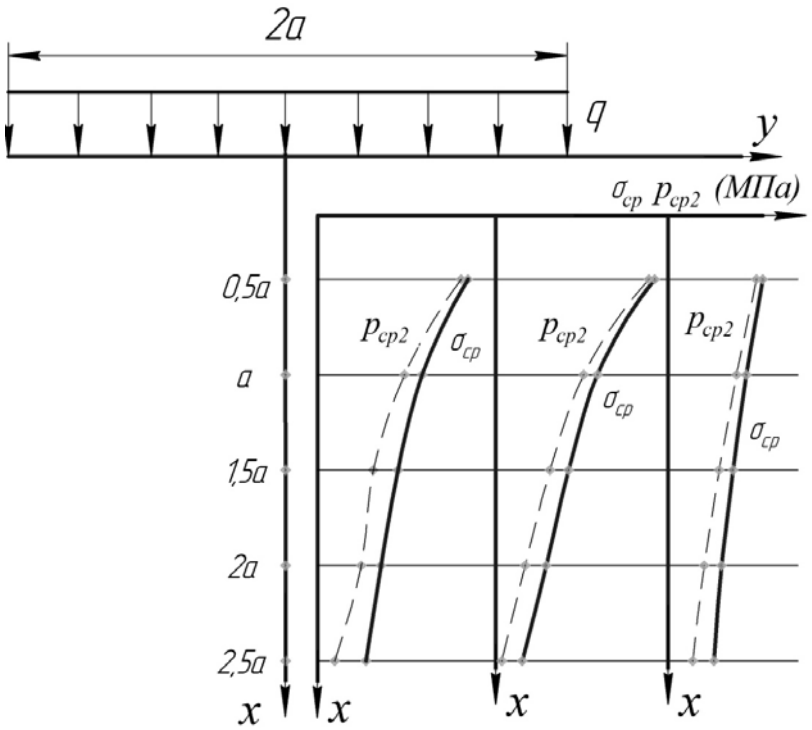

Fig. 3. Charts theoretical changes in average measured pressure and tension.$\sigma_{\text{cp}}p_{\text{cp2}}$

Conclusions

The stresses in the soil are quite complex, which primarily related to its properties. The discrepancy between the experimental and calculated values ranging from 2% to 10%, and it is greater, the less pressure. Experiments have shown sufficient compliance with the theoretical and practical values of stresses in the soil. This means that at relatively low loads soils show a linear-elastic response and investigation pruzhno-strain state of the soil can be used linear relationship between stress and strain. Hooke's law is not working at high loads that occur in the design of foundations under heavy construction. As you know, the sole foundation of high buildings tension may reach 0.6 - 0.8 MPa.

However, in our case, in spite of small tensions arising residual deformation. The table below comparing the results of stress measurements in the following cases: at running wheels measured at the point when the engine is running machines, with the engine switched off, and during the second turn of the engine and the wheels after the Congress of experimental points.

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In this article proposals technique with pomoshchju kotoroj can be morethan just pick vozdushnoy pressure of a camera at pressyometra Pneumatic pressure measurements in the soil.

Voltage, pressyometrы, deformation.

The paper proposes method by which it is possible to more accurately pick up pressure in air chamber of pneumatic pressure measurements pressuremeter soil.

Stress, presiometr, deformation.

UDC 519.21

SLABOZBURENA linear boundary problems For systems with impulsive

RF Ovchar, Doctor of Physical and Mathematical Sciences

The proposed scheme of coefficient of conditions of existence of solutions of weakly perturbed linear boundary value problems for impulsive systems at fixed times.

Matrix Green Cauchy problem, matrix-ortoproektor, generalized Green's operator method Vishika-Lyusternika.

Problem. Thought to exist uncertainty in the scheme of coefficient of Existence conditions of weakly perturbed linear boundary value problems for impulsive systems at fixed times.