$= \frac{11}{112} \times 10^{-2}$ kN/m

$q_{22} = \frac{1}{4} \times 10^{-2}$ kN/m

$\Delta_B = q_{21} = \Delta_2 = \frac{1}{8} \times 10^{-2}$ kN/m

**References:**

1. V.M. Fomin, I.P. Fomina. Theoretical mechanics. Dynamics. OSACEA. 2019.

2. V.M. Fomin, I.P. Fomina. Dynamic models for engineering problems (special course). OSACEA. 2021.

**UDK 624.138.232.1**

## FEATURES OF THE DEVICE OF SOIL-CONCRETE PILES

**Moraru A.N.,** *student of gr. PCB-619M(s)*
**Isaeva K.I.,** *student of gr. PCB-266*
*Scientific adviser –* **Karpiuk I.A.,** *PhD, Associate Professor (Chair of Bases and Foundations, Odessa State Academy of Civil Engineering and Architecture)*

**Abstract.** This article is about soil concrete piles. There are presented the technology of their production, advantages and disadvantages in a paper.

One of the main measures during construction in difficult engineering and geological conditions is the need to strengthen the soil. The stability and reliability of the building under construction depends on the quality of soil strengthening. One of the most effective ways to strengthen the soil is soil concrete piles [1].

The use of soil-concrete piles is most effective when: strengthening of soft soils at the base of buildings, roads, bridges, or tunnels; device of anti-filtration curtains; strengthening of foundations or reconstruction and superstructure of buildings; fencing of foundation pits; increasing the stability of slopes and slopes; filling of karst cavities in fractured rocky soils [2].

For the installation of soil-concrete piles, various technologies and

devices are used. The installation of soil-concrete piles according to the **Soilmix method is as follows**: a special device with a drilling tip, equipped with cutting blades, is immersed in the soil (Fig. 1). While the blades cut the soil layer and mix it, a liquid cement slurry is fed through the holes in the tip under high pressure.

Fig. 1. Ground-cement piles.

The method consists of **Jet grouting**, which consists in grouting the soil in two stages (Fig. 2). At the first stage, a small-diameter well is arranged. The second stage consists in raising the drilling rig while simultaneously injecting cement slurry under a pressure of 600 atm.

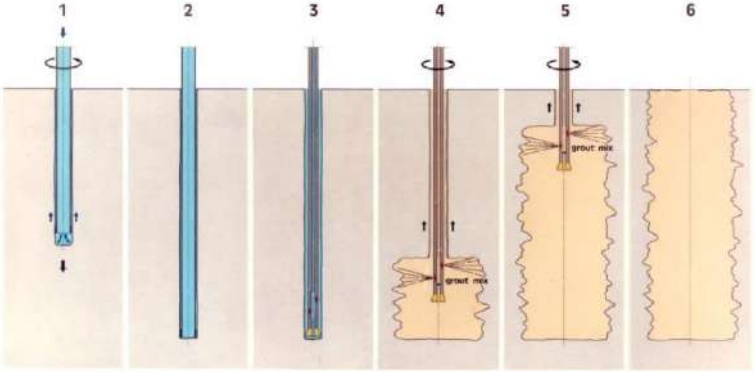


Fig. 2. Jet grouting of soils.

The third method, **called high-pressure injection**, is as follows: a device containing a tube is lowered into a small-diameter drilled hole (Fig. 3). Through it, cement slurry is fed into the soil under high pressure.

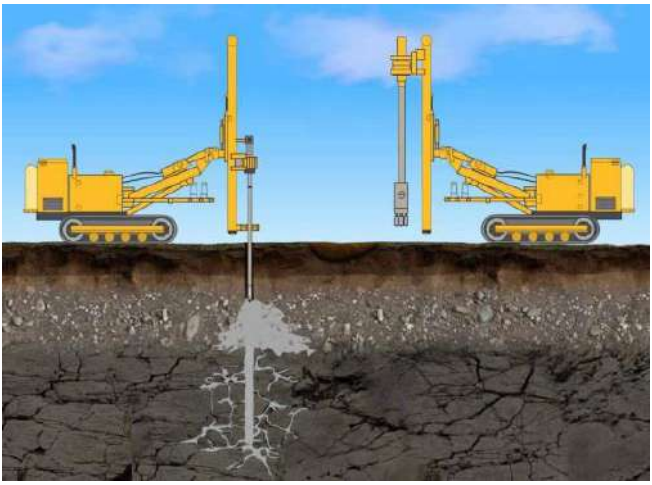

Fig. 3. High-pressure soil injection.

This method is effective and efficient in strengthening silty, silted, peaty soils. The device of these piles does not create additional dynamic loads, therefore they are actively used in the construction of new buildings, as well as for straightening inclined ones in the conditions of cramped urban development.

The above methods for installing soil-concrete piles have their own advantages and.

Benefits of using soil-concrete supports. The installation of soil-concrete piles makes it possible to carry out work in uncomfortable and cramped urban conditions, where it is impossible to apply traditional methods of strengthening the foundations of existing buildings and structures.

The device of soil-concrete piles by jet grouting is applicable for strengthening soils, from dusty and peat bogs to rocky ones. This technology has also proven itself well, with a high degree of reliability and in the construction of foundations in permafrost conditions with minimal labor costs.

Since this method of piling eliminates vibration loads on the ground, this makes it possible to carry out work near existing buildings.

The device of the pile by the method of jet grouting of the soil leads to significant compaction of the soil and the suspension supplied under pressure around the pile. This increases the bearing capacity of the pile of adhesion to the ground.

Thanks to the cement slurry mixed with the soil, the soil-cement piles

rest on the formed solid foundation, which increases their bearing capacity.

Disadvantages of supports. Despite the advantages, this method also has one significant drawback, which is that during grouting, an excessive amount of water gets into the soil along with the suspension. As a result, the groundwater level rises for some time, which, over time, stabilizes. [2]

**Conclusions**. Thus, each of the considered methods has its own advantages and disadvantages, thanks to which it can be used in certain cases. It should also be noted that for the installation of soil-concrete piles, special equipment is needed and specialists who must monitor it, therefore, only specialized organizations can deal with the installation of the above piles.

**References:**

1. Ground-cement piles [Electronic resource]. Access mode: https://svai-burenie.ru/news-paper/gruntocementnye-svai-2/

2. Soil concrete piles [Electronic resource]. Access mode: http://zmu.net.ua/p/756378707-gruntobetonnye-svai-gruntocementnye-svai/

Soil concrete piles - device technology. [Electronic resource]. Dost mode: https://opalubok.ru/gruntocementnye-svai.html

**UDC 624.04**

## RESEARCH OF FORCED VIBRATIONS OF AN ELASTIC MECHANICAL SYSTEM WITH ODF UNDER THE ACTION OF THE HARMONIC LOAD

***Petrash A.***, *student of gr. PCB-267*
*Scientific advisor –* ***Fomina I.P.,*** *Senior Lecturer (Chair of Theoretical Mechanics, Odessa State Academy of Civil Engineering and Architecture)*

**Annotation.** Earthquakes, wind, and shock waves from explosions cause considerable deformations, displacements, and strains in buildings and structures that depend on time and can lead to destruction of the structures. In addition, the mechanisms and machines located in industrial buildings also cause similar deformations and displacements due to the fact that these mechanisms and machines have unbalanced rotating parts, or they themselves are mechanisms of impact (hammers, presses, etc.). Impact mechanisms can also be located near the structure (for example, drop-hammer for driving piles).