ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 9 , September 2019

Vibrocreepage the Humidified Loess

RasulovKh.Z.,RasulovR.Kh., Babajanov M.B.

Doctor of Technical Sciences, Professor, Tashkent institute of architecture and civil engineering, Tashkent, Uzbekistan
Doctor of Technical Sciences, Tashkent institute of architecture and civil engineering, Tashkent, Uzbekistan
PhD doctorate, Tashkent institute of architecture and civil engineering, Tashkent, Uzbekistan

ABSTRACT: The article is devoted to researches property humidified loess soils at long dynamic influences. Creeping property of a soil is offered to be characterized factor vibrocreepage for which definition the special technique is developed. As a result of researches dependence vibrocreepage the loess from such factors, as is established: density - humidity of a soil, its mineralogical and gradual structure, a corner of an internal friction, cohesion, external loading, vibrating influences (acceleration, frequency, amplitude, the period and duration of fluctuations), etc. which account promote maintenance of stability of the constructions testing dynamic (seismic) influence at their operation.

KEYWORDS: vibrocreepage a soil, loess, viscosity factor, vibrocreepage factor, mineralogical and granular structures, a corner of a friction, cohesion, vibrating influence, fluctuation acceleration.

I. INTRODUCTION

The consolidation of loess soils at vibrating influences accumulation of volume deformations in time is characteristic. It speaks gradual accumulation of mutual displacement of particles from each separate period of fluctuations. At increase in frequency of concussion mutual displacement of particles are imposed and there is a process of their long displacement. Accumulation of deformations in time at constant accelerations of fluctuations and pressure is called vibrocreepage a soil [1].

Influence vibrocreepage is especially accurately shown in saturated the loess soil which is exposed to intensive vibrating. As show experiences, in such condition of loess of force of an internal friction between particles under the influence of vibration can be destroyed completely, and the soil gets mechanical properties of a viscous liquid. In such loess of a body with the density, exceeding its density, sink with some speed, and with smaller - emerge.

The creeping property of a soil shown in the conditions of vibration can be characterized in factor vibrocreepage[2]. Factor vibrocreepage loess and the factors influencing this indicator by practically sufficient accuracy are defined by means of «ball test» method by N.A.Tsytovich, which based the formula Stocsestablishing dependence speeds of movementof a ball in the viscous environment from force is put in a basis of this method, operating on it, radius of ball and factor vibrocreepage.

II. RELATEDWORK

The technique of implementing the experiences on studying of dependence of factor vibrocreepage a soil from acceleration of fluctuations consists of following.

The soil with certain density and humidity kept within a skilled vessel of vibrating installation. Further, the record of immersing ball at a constant of acceleration of fluctuations was made at the various static loading operating on it. After implemented tests with certain value of acceleration of fluctuations under the set static loading the acceleration quantity varied, immersing research was again made at following values of loading, etc.

As a result of such tests the schedules of dependence of immersing ball from time for loadings with different quantities are made at invariable preservation of value of fluctuations' acceleration. Results of researches have shown variable speed of immersing of a ball in a soil in the beginning of test and further reduction of this speed in process of depth increase. At the same time, in process of immersing of a ball of acceleration of immersing to aspire to zero, and speed gets more or less constant value. This circumstance depends on quantity of the loading enclosed to a ball and value of acceleration of oscillatory movement.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 9 , September 2019

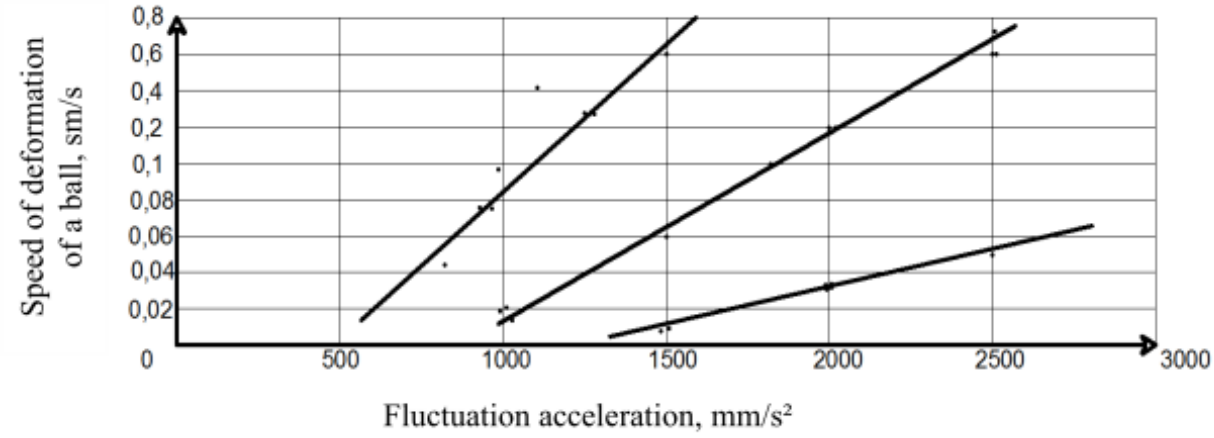

Fig.1. The figure of dependence of speed of immersing of a ball in a soil from intensity of fluctuation.

Dependence between the established speed of ball's immersing and the loading operating on it has linear character (fig.1). Factor proportionality between the loading enclosed on a ball and established in the speed of its immersing (the factor vibrocreepage) as it is seen from fig.1 essentially depends from on acceleration of fluctuations.

On fig. 2the schedule of dependence of quantity of factor from acceleration of fluctuations is illustrated. As it is seen from this schedule, the (accelerations of fluctuations, less 1,5g (where g acceleration a gravity) loess fluctuation practically does not render influence on factor quantity soil. Only at η>1,5$g$startup factor vibrocreepage is reduction. Communication between (in facto vibrocreepage and acceleration of fluctuations, it is approximately possible - to present in kind:

$$\eta = \beta\,(\alpha-\alpha_0)$$

wherea_0- a threshold vibrocreepaga soil.

Dependence of quantity of forces of cohesion in coherent soils from their condition of humidity allows to assume, that the factor vibrocreepage will depend also on humidity of loess.

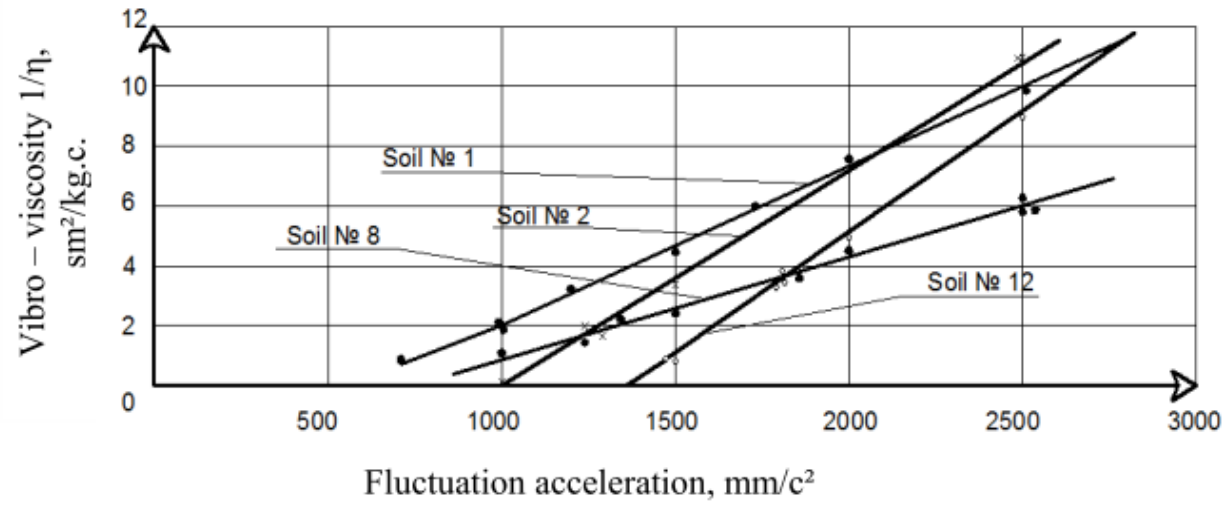

Fig.2. Dependence 1/η from acceleration of fluctuation for loess soils. Quantity, return of vibro - viscosity, sm^2/kg.c.Fluctuation acceleration, mm/c^2.

In this direction also, researches on the vibrating installation which technique is similar experiences by definition of dependence of factor vibrocreepage from acceleration of oscillatory movement have been carried out. Experiences were conducted with the same ball and to the same loess soils various humidity, however, acceleration of fluctuations, and also the static loading enclosed to a ball remained invariable in all researches.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 9 , September 2019

On fig. 3 the schedule of dependence of quantity vibrocreepage loess from humidity of a soil is illustrated.

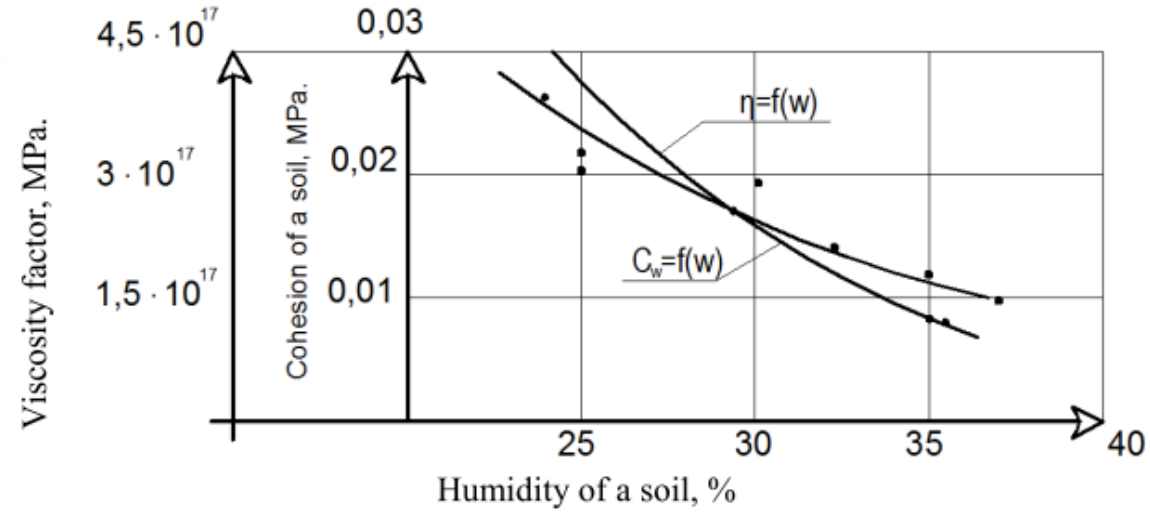

Fig.3. Character of change of cohesion and viscosity of a soil at humidifying. Viscosity factor, MPa. Humidity of a soil, %

The drawing below indicates that the factor a soil's vibrocreepage is not constant in time and depends on quantity of forces of cohesion (connectivity) of loess.

At the same time, the forces of cohesion as the factor of viscosity of clay breeds, can increase or decrease depending on humidifying degree. Reduction of force of cohesion in in addition sated with water soil reduces value of factor vibrocreepage.

If to assume that the quantity of forces of cohesive in soil depends on the maintenance in them of a moisture it is possible to consider, that the factor vibrocreepage will depend also on humidity of a soil. In our experiences any increase in humidity of a soil (for example, to 12-13%) led to increase of value factor vibrocreepage(8 and more remount). The further increase in humidity causes gradual reduction of its size.

Results of numerous experiences on research of dependence the factor of vibrocreepage from humidity of a soil allow to assume, that under all other equal conditions immersing of a ball by vibrating (from here the factor vibrocreepage is increase) will occur to the greatest speed in that case when the soil is in completely water sated condition.

In researches with loess soils faced some specific features:

- consolidation of the humidified loess at fluctuation was shown through some time after the loading appendix;
- intensity of consolidation during the initial moment was characterized by rather low values and gradually increased to certain quantity yet will not reach a stable condition;
- duration of a finding in a stable condition of deformation depended on humidity of a soil.

It proved the need for considering the duration of fluctuation along with its intensity at an estimation vibrocreepag soil that has given the chance the quantity of time necessary for display of creeping deformation of a soil to put in dependence first of all from durability of cohesion of loess.

It is known, that instability of structure loess soils speaks characteristic weak cohesions of their structural elements. Strength of cohesion depends on structure and water resistance of aggregating substance. Ability of a softening and dissolution in water of the natural cementing substance creating cohesion between particles of loess, defines completely or substantially character of cohesions.

Character of cohesion loess soil is expressed by the physical and chemical nature of cohesions, their water resistance and mechanical durability. We will assume, that the soil has friable addition and possesses forces of cohesion (conhesive). Loss of stability of structure of such soil is possible at infringement of forces of cohesion between its separate particles under the influence of pressure upon contact particles in the course of fluctuation.

The analysis of results of researches in the light of the above described assumption (testifies, that the following is necessary for infringement of structure coherent soil and transition in a creeping condition:

- the friable addition of particles of a soil at which porosity of a soil prior to the beginning of fluctuation n_0, causing infringement of its structure, would be more porosity of a soil n_t after influence of the specified factor, т.е$n_0 > n_t$;

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 9 , September 2019

-intensive the fluctuations, expressed in the form of acceleration, should be capable to break force of cohesion between soil particles;

- duration of fluctuation should make time demanded for occurrence a stable creeping condition a soil.

IV. CONCLUSION AND FUTURE WORK

As a result it is possible to draw a conclusion that if forces of cohesion between soils particles are not broken by operating fluctuations the soil is not deformed. Vibrocreepage the soil condition is not shown also when duration of fluctuation is measured only by several seconds (for example, duration of explosive influence).

Results of researches can be considered at designing and operation of buildings and constructions on loess soils in seismic areas.

REFERENCES

1. Ivanov P. L. The soils and the bases of hydraulic Engineering constructions. Moskow, "Higher school", 1985, P. 65-81.
2. Rasulov H.Z. Seismic stability of the soil bases.-Tashkent. "Uzbekistan", 1984, -192c.