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TECHNOLOGY COLLABORATION OF PIPELINES WITH SOIL IN SEISMICALLY HAZARDOUS AREAS IN THE REPUBLIC OF UZBEKISTAN

***Abstract**: This article provides an algorithm for finding the risks of pipeline accidents in seismically hazardous areas. The equation of a seismic wave propagating in the soil is presented, an expression for longitudinal and bending deformations, a formula for finding longitudinal dynamic stresses according to the requirements of existing standards, a relationship for assessing deformations of the soil mass.*

***Key words**: Pipeline, seismic loads, hazardous, zones, dynamic, problem, soil.*

***Language**: English*

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Introduction

When establishing seismic loads on pipelines, there is significant uncertainty leading to uncertainties in the magnitude and rate of potential displacement of pipelines. Because of this, when designing each specific section of the pipeline crossing the tectonic faults and seismically hazardous zones, it is necessary to take into account the individual characteristics of the MT location.

Designing and calculating the underground pipeline, it is also necessary to take into account the climatic features of the area, the nature of the environmental impact, soil-geological and seismic conditions. The issues of dynamic interaction of pipelines with soil during seismic impacts are relevant for both domestic and foreign practice.

Development of a pipeline system is impossible without a high level of reliability of facilities. The need to improve the design apparatus leads to the improvement of pipeline design and construction technologies, the use of new materials, and construction in earthquake-prone zones.

In methodological approach to assessing the risk of MT accidents crossing seismic activity zones is presented, based on the need to correlate the probability of accidents occurring in seismically hazardous zones with the frequency of occurrence of damaging earthquakes. In the event of earthquakes, the likelihood of accidents in pipelines depends on the intensity of the events.

The process of finding the risks of pipeline accidents in seismically hazardous zones is divided into the following steps: the frequency of occurrence of earthquakes with different degrees of intensity is determined by the PX cards according to the event intensity [9], the probability of an accident on the pipeline is found → the pipeline is divided according to the PX cards to parts with different earthquake intensities → in areas with potential emergency situations at intensities on maps A, B and C, the mathematical expectation of the lengths of the sections is determined → for real In the event of events on the PX cards, the conditional probabilities of accidents on the pipeline under consideration are calculated → the risk of accidents on the pipeline structure is assessed taking into account the possible dangerous situation on maps A, B, C → the pipeline emergency risks under seismic impact are the highest → assuming the independence of events is calculated integral risk of MT accidents in earthquake-prone areas.

Rashidov T.R. in 1973 he proposed the “seismodynamic” theory of earthquake resistance, which was necessary for calculating complex systems of underground pipelines with branches and inclusions. The monograph discusses the interaction of the pipeline and soil outside the tectonic fault zone under the influence of seismic waves, as well as the effect of soil on the stress-strain state (SSS) of the pipeline under seismic effects. Moreover, Rashidov T.R. does not concern the problem of soil and pipeline interaction in zones of tectonic faults with transverse velocity movements of the soil.

In the work of Belyaev A.K. (2001) it is noted that such a statement of the problem is relevant in the case of homogeneous linear sections of structures. Local fluctuations can occur with differences in the geological properties of the base soil and with structural inclusions.

Among foreign researchers studying the dynamic properties of soils, the works of the Japanese scientist Ionin M.F. In his work it is shown that the resistance of soils to dynamic loads exceeds 1.5-2 times the resistance to static loads.

The algorithm for calculating underground pipeline structures in the presence of contact interaction with the soil mass with constructive nonlinearity is described in the work of V. Petrova The solution of a structurally nonlinear dynamic problem in volumetric formulation by the method of direct stepwise integration over time is the basis of the technique. The effect of various nonlinearities (structural, physical) on the kinematic characteristics and the SSS of the pipeline under the influence of longitudinal seismic waves is analyzed.

The problem of studying the behavior of underground pipelines during seismic impacts and in zones of active tectonic faults (APR) was considered in a linear statement abroad: Yu X. (2004), Jeffrey R.K., Douglas G.H. (2008), Baum R.L., Devin L.G., Edwin L.H., Arya A.K., Shingan B., Prasad Ch. Vara (2008). In these works, the issues of changing the rheological properties of the soil and their effect on the magnitude of the loads transmitted to the pipeline were not studied.

Conclusions

Consequently, the problem of analyzing behavior of pipelines in difficult geological conditions is increasingly relevant. Given the large number of factors influencing the pipeline design, a generalized pipeline model is necessary to make a behavior forecast. It is a collection of models:

- ❖ pipeline as a structural element;
- ❖ the influence of an aggressive environment;
- ❖ pipeline material;
- ❖ the onset of the ultimate state;
- ❖ pipeline interactions with soil;
- ❖ pipeline loading.

This way of considering the behavior of the pipeline structure is an implementation of the approach when the pipeline is presented as a complex system with a number of subsystems.

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