

TOPICAL ISSUES OF USE OF GEODETIC MEASUREMENTS AT GEODYNAMIC MONITORING OF OBJECTS OF OIL AND GAS COMPLEX

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Actual problems that arise in the design and analysis of the results of repeated surveying and geodetic observations of the modern geodynamic state of the mining allotments of hydrocarbon deposits and underground gas storage facilities are discussed. A review of a large data set shows that there are two main forms of abnormal deformations of the earth's surface due to the exploitation of oil and gas facilities – extensive subsidence of the field's territory and local deformation of fault zones.

The results of mathematical modeling of the formation of deformations of the earth's surface caused by the development of deposits are presented and it is shown that the maximum amplitudes of the vertical displacements of the earth's surface are concentrated in the central part of the deposits, and the maxima of the horizontal ones are in the peripheral part. It is established that the influence of the earth's surface, free of stresses, leads to the fact that the amplitudes of vertical displacements, *ceteris paribus*, always prevail over horizontal ones, which are formed under conditions of horizontal constraint from the side of the surrounding rocks. Based on the developed model, the distribution of the gradients of vertical (slopes) and horizontal (relative deformations) displacements of the earth's surface, which are compared with critical (normative) values, is constructed.

Objective limitations are demonstrated that arise when comparing the results of observations obtained by satellite and ground-based geodesy and, in particular, using satellite radar interferometry. Concrete solutions and schemes for constructing a system of geodynamic observations and optimal regulations for conducting geodynamic monitoring of fields to ensure industrial safety of infrastructure facilities are proposed.

Key words: modeling, deformations of the earth's surface, displacement gradients, satellite radar interferometry, geodetic measurements, geodynamic monitoring, oil and gas fields.

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