

GEODEZY AND MINE SURVEY

**PHASE MEASUREMENTS CONTROL OF GNSS RECEIVER
WITH ATOMIC CLOCK**

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The technique for GNSS phase-measurements control is described. It is based on comparison of geometrical distances increments calculated by measurements and modeled by satellite and receiver coordinates taking into account the changes in tropospheric and ionospheric delays. It is shown that the moving average may be applied in the technique of GNSS phase-measurements control for detecting cycles and bursts counting loss. The authors present the example of detecting cycles counting loss in GNSS phase-measurements conducted by the receiver with high-stable frequency generator.

Key words: GNSS, receiver, measurement, carrier phase, cycle jump, moving average, geometrical distance.

**COMPARISON OF THE GOCE PROJEKT SATELLITE MODELS WITH
DIFFERENT SETS OF INDEPENDENT TERRESTRIAL GRAVIMETRY DATA**

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In this paper the comparison of modern satellite models of the Earth's gravity field with independent terrestrial gravity data covering in two areas of the Earth's surface in order to obtain estimates of their accuracy is made. As independent gravity data the free-air gravity anomalies obtained from measurements on the surface of the Earth are used. On the territory of Western Siberia the free-air gravity anomalies set in 27 randomly located points of the Earth's surface. On the Sea of Okhotsk the set free-air gravity anomalies values in 54 trapezes size $5 \times 5'$.

Experimental research in graphical form is shown. The analysis of the results is performed.

Key words: satellite models, Earth gravity field, independent terrestrial gravimetry data, GOCE international space project, resolution, accuracy, comparative analysis.

STATISTICAL EXAMINATION OF RETAINING WALL DISPLACEMENT BY GEODETIC MEASUREMENTS RESULTS

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The paper presents analysis of geodetic measurements concerning retaining walls displacement in Kiev residential areas. Analysis of variance as a technique for observation results processing is offered. The displacement effect dependence on the cycle of observation was studied by a single-factor analysis of variance. The single-factor analysis of variance also revealed that deformation process dynamics is different for different retaining walls. Interdependence between the observation cycles and retaining walls location was determined by the two-factor analysis of variance. The three-factor analysis of variance made it possible to see the effect of deformation benchmark position on the displacement value. Analysis of variance is

proved to be a promising technique for geodetic measurements analysis, especially in case of a large-scope observation.

Key words: analysis of variance, displacement, variance ratio, significance level, retaining wall, slide, deformation forecasting.

LOGISTIC LAW OF GEODESY DEVELOPMENT AS SPACE-TIME PREDETERMINATION

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The theory of geodesy development in terms of predetermination theory is considered. The laws of geodesy development in the paradigm change sequence are presented. Mathematical model of the development parameters (over historic epochs) are considered. Approximate forecasts for the nearest development of geodesy and the mechanism for determining basic crucial points in its making are given.

Key words: predetermination theory, logistic law, compression coefficient.

TECHNIQUE FOR JOINT DETERMINATION OF ASTRONOMICAL COORDINATES FOR ELECTRONIC THEODOLITES

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The issues of astronomic determinations upgrading are considered. The problem results from the brand-new techniques and facilities of geodetic instrument-making. Taking into account the characteristics of new electronic theodolites the author offers the technique for joint determination of astronomical coordinates. It is shown that astronomic latitude and longitude may be determined simultaneously by zenithal and azimuthal methods in case of joint reading of vertical and horizontal circles (for the same time, when observing the stars) applying the pair of combined zenith-difference and Zinger methods. The examples of observation records, and the formulas of latitude and longitude determination are given. These determinations are shown to be promising.

Key words: determination of astronomic coordinates, techniques for astronomic determinations, improvement of accuracy and efficiency of astronomic determinations.

RESEARCH OF RELATIONSHIP GRAVITY DISTURBANCE AND GRAVITY ANOMALY

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Considers the problem of transition from gravity disturbance to gravity anomaly and back. If the known geodetic and normal height, and the formula for calculating the gravity disturbance or gravity anomaly, then recommended switch to measure the acceleration of gravity. Then anomalies is calculated using the ellipsoid associated with the desired coordinate system. If the height is unknown, then for transition from gravity anomaly to gravity disturbance and back using the ellipsoid, as agreed with the calculation formula of the normal gravity acceleration. Gravimetric data processing performed using the agreed parameters of the ellipsoid, and the results of processing to convert the desired coordinate system.

Key words: gravity, gravity anomaly, gravity disturbance, quasigeoid, ellipsoid, normal gravity field.

ANALYSIS OF THE RUSSIAN NATIONAL REFERENCE NETWORK CONDITION CONSIDERING MODERN AND PROSPECTIVE REQUIREMENTS

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The development results of the new three-level Russian national reference network and precision of its connection to the national network of the previous generation are analyzed. Mutual temporal stability of geodetic networks is estimated for short- and long-term periods.

Key words: coordinate-time and navigation support, national reference network, condition, precision, stability, Global Navigation Satellite Systems (GNSS).

LAND MANAGEMENT, CADASTRE AND LAND MONITORING

MULTICONTOUR LAND UNITS

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The concept of «multicontour land unit» is considered. Though the units of this type actually exist, the term and its meaning content are to be legislated. The authors present some ideas on the more accurate definition of the «multicontour land unit» concept.

Key words: land unit, uniform land use, multicontour land unit, adjacent land units, servitude, land units formation methods.

SATELLITE IMAGES TO BE APPLIED FOR LAND UNITS BOUNDARIES DETERMINATION

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The object of this research is to analyze the possibility of applying satellite images to determine land units boundaries coordinates for improving information quality of the *National Real Estate Cadastre*. To solve the problem, the research was conducted concerning accuracy of land unit boundaries length determination by satellite images. The procedure is useful for obtaining information on the boundaries of earlier registered land units.

Key words: *National Real Estate Cadastre*, satellite images, cadastral information on land unit boundaries location, line length determination accuracy, public cadastral map, land unit.

ANALYSIS OF REASONS FOR DENIAL AND SUSPENSION OF STATE CADASTRAL REGISTRATION

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The reasons for suspension and denial of state cadastral registration are analyzed by the example of two regions. The authors put forward two positive tendencies resulting from the new legislation. Due to the change of the meaning content in some law articles, the number of reasons for the denial may be reduced.

Key words: state cadastral registration, land unit, suspension and denial of state cadastral registration, tax base.

STATE LAND-USE CONTROL ASSESSMENT (BY EXAMPLE OF FOREST LAND RESOURCES IN FRAMEWORK OF PROGRAM «FOREST MANAGEMENT DEVELOPMENT 2013–2020»)

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Theoretical concept of «efficient land use» principle formalization and the techniques for this efficiency assessment (as regards concrete land units including forest sites) are presented here as a basis to be applied for management system analysis mechanism. The authors demonstrate this mechanism using the example of the state Program for forest management development in Russia. The presented results vividly characterize the stages of the Program implementation and put forward the role of its components. The latter are interpreted as organizational and legal, economic, ecological and technical indices of state forest resources (and relevant lands) management.

Key words: land use, forest sites, efficiency criteria, state program.

**COMMERCIAL PROPERTY ON NOVOSIBIRSK TERRITORY:
GEOINFORMATION ANALYSIS OF RENT VALUE DISTRIBUTION**

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The paper discusses the approach to geoinformation analysis of distribution value of commercial real estate rent on the territory of Novosibirsk city. Real estate rent in Novosibirsk depends on many factors, such as location, quality of repair and availability of the necessary communications, as well as parking. Graphical interpretation allows to obtain the "price zones" – areas with a closely range of price. For analysis of the distribution value of commercial real estate rent on the territory of Novosibirsk city was applied methods of GIS analysis.

Key words: geoinformation analysis, functional zoning, real estate object.

PLANNING OF GEODETIC SURVEY FOR NATIONAL REAL ESTATE CADASTRE BY EXAMPLE OF KEMEROVO

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The working model used here is to present computer-aided technology for planning geodetic survey for National Real-estate Cadaster. The offered technology involves application of raster base, MapInfo software, and special computer program Logos200 to estimate geodetic survey design accuracy. In the framework of the implemented design, three variants of geodetic survey (reference network for cadastral survey) applying both traditional ground-based measuring instruments and modern GNSS-technologies are considered. Taking into account the results of the weakest parameters accuracy estimation, current geodetic survey is inexpedient for using as a reference basis for National Real-estate Cadaster. Network-based GNSS-surveying as an optimal alternative for designing geodetic surveys is offered.

Key words: national real-estate cadaster, reference network for cadastral survey, geodetic survey, mean-root-square error, parameters accuracy, GNSS-surveying.

IMPROVEMENT OF INFORMATION EXCHANGE FOR MUNICIPAL UNIT TAXABLE BASIS FORMATION

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The problems of collecting taxes for the local budget are considered. The normative taxable basis is analyzed. The shortcomings of taxable basis formation in transition period are emphasized, and the arising problems solutions are offered. The mechanisms of State Land Supervision and cooperation with different bodies and organizations are to be applied for the purpose. In the same context, the prospects for administrative legislation are considered.

Key words: tax, taxable basis, cadastral value, inventory value, state land supervision, municipal land supervision, supervising authorities.

ECOLOGY

ECONOMIC AND TERRITORIAL PLANNING BY LAWS OF BIO-GEO-CHEMICAL ACTIVITIES ACCORDING TO SANITARY-AND-EPIDEMIOLOGIC REQUIREMENTS

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The scheme of territorial planning is shown as a completing part of theoretical and practical content of physical and economic geography. Territorial planning is not an original opinion for urban development, being a discussion on the geographic determinism. It offers an alternative of extensive nature management. It has been proved that the scheme of territorial planning repeats the methods for assessing some planned activities environmental impact. An important object of territorial planning is minimization of maintenance costs, which are determined by land-use and land units fate categories. Qualitative scheme of planning is approximate to the socialist planning, however, it violates economic proportions for the benefit of market.

Key words: economic zoning, territorial planning, natural territorial complex, territorial production complex, scheme of territorial planning, geographic determinism, social progress, sanitary-hygienic requirements.

PRINCIPLES AND TECHNIQUES FOR ECOLOGICAL AND ECONOMIC ASSESSMENT OF AGRICULTURAL LANDS

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The author substantiates the principles and techniques for creating the system of agricultural lands ecological and economic assessment. The author offers a normative method, the technique of assessment by profitability per unit of soil-ecology index, and capitalization-of-land rent method applied for the state cadastral valuation. Negative ecological factors impact (in value terms) is calculated by the techniques for estimating the damage of land resources degradation and contamination. Estimation is based on the principle of alternative value. Main results of ecological-and-economic assessment system practical application are given concerning croplands and meadowlands of Ordynsky district, Novosibirsk region.

Key words: agricultural lands, ecological and economic assessment, ecological factors, cost, damage.