List of abstracts of the presented materials for participation in a competition for the appointment of the academic position "professor" in the field of higher education 5. "Technical sciences", professional field 5.7. "Architecture, Civil Engineering and Geodesy", scientific specialty "(Photogrammetry and Remote Methods)"

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A. Monographic work

"Laser Scanning - Achievable Precision in Photogrammetry, Remote Sensing and Geodesy"

Thanks to the rapid development of technical means, modern remote sensing is able to provide various scientific and industrial structures with spatio-temporal data on terrain objects, engineering structures and relief. Such data are necessary for solving environmental, management and various engineering problems, as well as for automated analysis in the management of territories based on three-dimensional geoinformation support.

Of all the variety of new technical means, a special place is occupied by laser geodetic systems, which, in view of their advantages, significantly expand the possibilities of the theory and practice of the phototopographic method for collecting spatial data. The main advantages of such systems are: automation of the information collection process, high level of detail, etc. Nowadays, the theory and technology of laser scanning are not sufficiently developed.

Laser scanning is performed with a certain step. In this case, the scanning resolution is always set at least twice the detail requirements for laser imaging (to reliably identify fine details of objects during processing). This circumstance, taking into account the Kotelnikov-Shinon signal recovery theorem, allows us to conclude that laser-scanned materials are a continuous set of data in the creation of specific products and are analogous to images.
The development of laser scanning tools greatly stimulated the development of new methods of presenting information about the area, translating information technology from a plane to three-dimensional space. Three-dimensional or virtual geoinformation systems have received significant development, which necessitated the development of fundamentally new methods for storing, processing and analyzing spatial data.

The monographic work examines the evolution of ideas on the subject and the methods of modern measurements carried out with the help of ground-based laser systems. Problems in the measurement of meteorological parameters affecting the accuracy of observational results obtained by methods of terrestrial and satellite scanning systems are discussed. Attention is paid to the different types of laser systems and photogrammetric principles of operation, including their design, conducting measurements and mathematical modeling of the results.

B. Publications

1. "Investigation of the application of gravimetric methods for defining seismogenic zones and physical processes" – Geodesies studies of the modern movements of the earth's crust caused by seismotectonics reasons are an important part of learning of seismogenius areas. Geodesies measurements allow to determine and trace the spatial position of material on the ground control points. Set in some of their moving in space and in the development of fast and slow movements, given the opportunity to be acquainted processes of accumulation, liberation and transfer of tectonic economic shifts voltages.

2. "Satellite gradiometry – an excellent addition to the general dynamic method of space geodesy" – Satellite gradiometry is a new area of study of the characteristics, fine structure and process of changing the Earth's gravitational field. Gradiometry aboard a satellite will improve the global accuracy of Earth's gravitational patterns with a resolution not achieved so far.
3. "Gradiometric measurements with on-board gradiometer" – The subject of this study is to consider possible options when using satellite gradiometry, in particular gradiometric measurements with a gradometer on board. The aim is to show the significant advantages of satellite gradiometry compared to ground and aircraft.
4. "Assessment of the possibility of practical use of an unmanned aerial system in three-dimensional modeling of the terrain surface" – The subject of the study is the evaluation of the local geoid modelling for Southwestern Bulgaria through the methods of GPS/levelling and through analysing the results from comparing the global geoids EGM2008, EGM96 and EGM84. The applied method and the developed methodology for local geoid modelling are suitable to be applied to the examined area, as well as to other areas of the country or to its whole territory.
5. "Redefining the capabilities of the unmanned aerial system for the needs of the cadastre" – The subject of the study is the evaluation of the local geoid modelling for Southwestern Bulgaria through the methods of GPS/levelling and through analysing the results from comparing the global geoids EGM2008, EGM96 and EGM84. The applied method and the developed methodology for local geoid modelling are suitable to be applied to the examined area, as well as to other areas of the country or to its whole territory.
6. "Applications of geographic information systems in forecasting the conditions of aerospace research" – The formation of a highly dynamic layer of continuous phenomena of the geographic information system is due to the great dynamics of changes in meteorological conditions. Forecasting the conditions of aerospace images must ensure the best image quality. Information on the optical characteristics of the atmosphere, the illuminance of the earth's surface, the spectral reflection coefficients and even the parameters of measuring the exposure of the image can be provided in the efficiency of remote sensing equipment and applied in the form of dynamic GIS layers.
7. "Possibility of building geoinformation systems based on the principle of the non-deterministic method (H-method)" – Based on the apparatus of S-models, a technology for multilevel programming has been created, which allows solving new classes of problems in areas such as GIS [A. S. Narinyani, 1980]. With the help of the (S-method) the shortcomings in working with insufficiently defined information in GIS systems are eliminated.
8. "Accounting of the atmospheric influence when planning geodetic activities" – The density of the air in the ground layers changes in height, which causes the sight beam to change its trajectory, taking the form of a curved line, more often turned with its concave part to the earth's surface. Due to ground refraction, the measured zenith or vertical angles differ from the real ones by a small angle called refractive. Vertical refraction technology, based on temperature gradient measurements and involving

measurements in the reference direction, can be used in a wider range of practical applications..

9. "Possibilities for creating basic geodetic networks using laser scanning" – The subject of the possibilities for creating a triangular network of points using ground-based laser systems (GLS). An assessment of the accuracy of photogrammetric imaging for the practical use of GLS in the creation of scan-triangulation has been made. An analysis has been made and the possibilities of its use have been substantiated.
10. "Evaluate the accuracy of creating 3d models and topographic plans" – The subject of the possibilities for creating 3D digital models of objects and terrain with the help of ground-based laser systems (GLS). The accuracy of photogrammetric imaging for practical use of GLS in creating 3D digital models has been evaluated. An analysis has been made and the possibilities of its use have been substantiated.
11. "Terrestrial Laser Scanning" – The subject of the study is the capabilities of ground-based laser systems (GLS) equipped with new modules and systems. The accuracy of the photogrammetric survey for practical use of GLS in three-dimensional survey of infrastructure sites and terrain has been assessed. An analysis has been made and the possibilities of its use for creating 3D models have been substantiated.
12. "The influence of air density on received laser signals" – The subject of the research is to make a correct assessment of the atmospheric parameters and to choose a model for their removal, achieving the required accuracy and high productivity with minimal material costs when conducting laser measurements.
13. "The influence of turbolity on laser signals" – The subject of the research is to make a correct assessment of the vibrations and to choose a model for their elimination, which will allow achieving the required accuracy and high productivity with minimal material costs when performing laser measurements.
14. "Error in determining the permanent correction of the measured distance by a ground laser scanner" – The subject of the research is to make a correct assessment of the error in determining the constant correction of the measured distance and to choose a model for their removal, which will allow achieving the required accuracy and high productivity with minimal material costs when performing laser measurements.

C. Textbooks

1. The textbook "Photogrammetry and Remote Methods Part I" is intended to support the theoretical and practical training of students in disciplines of the same name or similar in meaning and content. The textbook outlines the theoretical foundations for the use of photogrammetry and remote methods for solving geodetic tasks. Forms the ability to use knowledge of modern technologies for collecting, systematizing, processing and recording information about real estate objects, modern geographic and land information systems. Great attention is paid to the metric and interpretive properties of various information models in order to form an idea of the prospective directions for obtaining and processing aero- and space video information in carrying out specialized studies, project works and observations of the state of the natural environment. Creates skills to assess the quality of air and space research procurement, the suitability of

research materials. To be able to competently accept planning and cartographic material from the filming organizations. The textbook provides skills in the application of information technologies for solving tasks of reception and processing of aero and space video information when carrying out specialized studies and design.

2. The textbook "Photogrammetry and Remote Methods Part II" is intended to support the theoretical and practical training of students in disciplines of the same name or similar in meaning and content. The textbook outlines the theoretical foundations for the use of photogrammetry and remote methods for solving geodetic tasks. Forms the ability to use knowledge of modern technologies for collecting, systematizing, processing and recording information about real estate objects, modern geographic and land information systems. Great attention is paid to the metric and interpretive properties of various information models in order to form an idea of the prospective directions for obtaining and processing aero- and space video information in carrying out specialized studies, project works and observations of the state of the natural environment. Creates skills to assess the quality of air and space research procurement, the suitability of research materials. To be able to competently accept planning and cartographic material from the filming organizations. The textbook provides skills in the application of information technologies for solving tasks of reception and processing of aero and space video information when carrying out specialized studies and design.
3. The textbook "Digital Image Processing Part I" is intended to support the theoretical and practical training of students in disciplines of the same name or similar in meaning and content. The proposed textbook allows to effectively master the use of modern computers in the educational process and to quickly acquire practical skills. It is devoted to methods of building remote sensing systems and the theory of digital image processing. It helps to train competent professionals to have the ability to work with Earth remote sensing methods. To master specialized software and practically work with data from satellite images.
4. The textbook "Digital Image Processing Part II" is intended to support the theoretical and practical training of students in disciplines of the same name or similar in meaning and content. The proposed textbook allows to effectively master the use of modern computers in the educational process and to quickly acquire practical skills. It is devoted to methods of building remote sensing systems and the theory of digital image processing. It helps to train competent professionals to have the ability to work with Earth remote sensing methods. To master specialized software and practically work with data from satellite images.

City of Shumen

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Candidate:

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