O P I N I O N

of a dissertation for the acquisition of an educational and scientific degree "doctor"

Author: Mag. Eng. Krasimir Zhivkov Terziev

Topic: Modern satellite communication systems and innovative methods for increasing their efficiency

Field: 5. Technical sciences, **Direction: 5.3** Communication and computer technology,

Scientific specialty: Communication networks and systems

Member of the Scientific Jury: Prof. Dr. Sc. Eng. Ivo Malakov, TU - Sofia, Order No. 25/29.01.2024 of the Director of IICT of BAS

The dissertation submitted for opinion is 171 pages long and is structured in 4 chapters, conclusion, contributions, list of publications on the dissertation, bibliography and declaration of originality. The bibliography includes 100 literary sources. In connection with the work, 7 scientific publications are presented, of which two are independent, and in four others the doctoral student is the first author. No citation reference are given.

The work was developed at IICT - BAS under the scientific supervision of Prof. Dr. Eng. Dimitar Karastoyanov.

1. Relevance of the problem developed in the dissertation

The dissertation is in a promising and current field of satellite communication systems, which has been the subject of intensive research in recent years. That is why each new development enriches and further develops the knowledge and methods for solving problems in the field under consideration. The designed and studied antenna system for a ground station for satellite communications for low-flying satellites is characterized by improved operational characteristics compared to previously known solutions - higher communication speed, greater signal amplification, increased reliability, etc.

All this determines the relevance and significance of the research in scientific and applied terms.

2. Degree of knowledge of the state of the problem and creative interpretation of the literary material

An overview and analysis of the evolution and prospects for the development of satellite communication systems and their technological components has been made. Problems in the design and operation of satellite communication systems are considered. Special attention is given to low earth orbit satellite communications. On this basis, the goal of the dissertation work and the tasks for its achievement are formulated.

I believe that the candidate is well aware of the current state of the art in the field under consideration.

3. Correspondence of the chosen research methodology and the set goal and tasks of the dissertation with the contributions achieved

In the thesis, an antenna system for a ground station for satellite communications for low-orbit satellites was developed and investigated. The possibilities for the application of such a satellite system and for the implementation of additional functions such as video surveillance of various phenomena are also analyzed: disasters, fires, agro-technological features, etc.

From the presented results, it can be concluded that the chosen research methodology is adequate to the set goal and tasks of the dissertation work, which fully correspond to the achieved results and contributions.

4. Characterization and evaluation of the dissertation work

The dissertation demonstrates a good knowledge of the problems and technological features of the components of satellite communication systems, as well as methods for their development and research. On this basis, the PhD student designed an antenna system for a ground station for satellite communications, which was implemented. An experimental study, analysis and evaluation of the technological parameters of the developed system was carried out and its effectiveness compared to known solutions was proven.

I positively evaluate the results of the development and their research. They have a practical nature and potential for future application.

5. Scientific and/or scientific-applied contributions of the dissertation work

The candidate has presented a reference with contributions that are predominantly applied in nature - designing an antenna part of a satellite communication system, its experimental research and analyzing the functional and capabilities. I rate these contributions as sufficient, but they need editing and refinement. They convincingly prove that the candidate can independently carry out research and design activities in the field of dissertation work.

6. Evaluation of the degree of personal participation of the dissertation student in the contributions

I believe that the dissertation work and its contributions are the personal work of the doctoral student under the competent guidance of his scientific supervisor.

7. Evaluation of publications on the dissertation work

In connection with the dissertation, 7 papers were made. publications, of which 2 are independent. One of the publications is in refereed edition indexed in the Scopus database. I have no information about the author's work citations.

The presented publications on the dissertation work sufficiently fully and accurately reflect essential aspects of its content and popularize the work performed.

8. Significance of the results of the dissertation work in science and practice

The results of the dissertation work can be used in the design of modern specialized communication elements of satellite communication systems using LEO satellites (Low Earth Orbit) - satellites in a low orbit. They are a good prerequisite for expanding the work on the subject after a successful defense of the dissertation.

9. Recommendations and critical notes

I have no substantive objections to challenge the applicant's main contributions.

Notes and recommendations:

- There are uncorrected editorial, terminological and technical errors. It is recommended that the exposition be in the third person impersonal form: it was done ..., it was studied ... . Not all literary

sources are cited in the text; the bibliographic reference is not prepared according to the current standards.

● The work would win if, during the design of the ground station, a set of alternative variants of the building components was developed and their selection justified by a set of technical and economic criteria and constraints.

CONCLUSION

Based on my familiarity with the dissertation work and its materials, the fulfilled educational goal of the doctoral studies, the relevance and significance of the contributions achieved, I give a POSITIVE evaluation of the dissertation work. All the requirements of the Law on the Development of the Academic Staff in Bulgaria, of the Regulations for its application, as well as the specific requirements for acquiring scientific degrees at IICT-BAS in terms of scope, volume and quality of the dissertation work have been fulfilled.

On these grounds, I suggest to mag. Eng. Krasimir Zhivkov Terziev to be awarded the educational and scientific degree "doctor" in area 5. Technical sciences, professional direction 5.3 Communication and computer technology, scientific specialty Communication networks and systems.

19.02.2024

Jury mem

На основание
ЗЗЛД