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## QUANTITATIVE ASSESSMENT OF THE TECHNICAL LEVEL OF SPACE SYSTEMS OF EARTH REMOTE SENSING AND GEOSTATIONARY SATELLITE COMMUNICATION SYSTEMS

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This paper presents a methodological approach to assessing the technical level of space systems of Earth remote sensing (SSERSs) and geostationary satellite communication systems (GSCSs) developed by the Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine together with Yuzhnoye State Design Office. The approach allows one to substantially increase calculation quality and reduce the human factor effect in the determination of this index. This is achieved due to a high level of formalization of the technical level quantification process and the use of mathematical methods employed in the modern decision making theory.

The technical level index is a qualitative measure of the perfection of a product and the quality of the products (services) produced with its use. The technical level index is one of the key techno-economic indices of development work. The value of the technical level index is a determining factor (together with the development and operation costs) of the competitiveness of a newly developed space system.

The identity of the SSERS and GSCS technical structure, especially that of the platforms of SSERS and GSCS spacecraft, made it possible to construct a unified methodological approach to solving the problem of quantitative assessment of the SSERS and GSCS technical level index. The difference will only be in details of technical level calculation algorithms. The major difference is in the choice of an optimal set of particular technical efficiency indices for each space system.

The methodological approach is based on a mathematical model of Saaty's analytic hierarchy process extended by the authors to include mathematical models for accounting as fully as possible for the SSERS and GSCS technical features and checking for errors and contradictions in the judgments of the experts who take part in the preparation of basic data on immeasurable or hard-to-measure SSERS and GSCS techno-economic indices.

Based on the presented methodological approach, one may develop a state-of-the-art sectorial methodology for SSERS and GSCS technical level quantification.

**Keywords:** *technical level quantification, space system of Earth remote sensing, spacecraft, analytic hierarchy process, space-rocket hardware, geostationary satellite communication system, technical level.*

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