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КОСМИЧЕСКИЕ ТЕХНОЛОГИИ: НАСТОЯЩЕЕ И БУДУЩЕЕ

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UNITS FOR PROPELLANT VAPOR AND SPILL NEUTRALIZATION BY THERMAL DECOMPOSITION. LESSONS LEARNED AND DEVELOPMENT OUTLOOK

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Operation of space launch systems with launch vehicles burning storable toxic propellants. Difficulties in compliance with the environmental safety requirements when such propellants are used.

Neutralization unit. Design and operation concept.

Neutralization unit components. Neutralization unit operation description. Description of the propellant thermal decomposition chemical process. Accessory substances formed during the propellant thermal neutralization, fraction composition of gas emissions during the unit operation.

Current deficiencies and ways to improve the neutralization unit design and
the thermal decomposition process

Description of the neutralization units (11Г426, 11Г427), which are operated in the strategic rocket forces military units, and information about troubles with their performance. Analysis of contemporary materials science achievements, and using advanced technologies to improve the neutralization unit design (combustion chamber). Using urea solution to reduce the maximum acceptable concentration of hazardous substances contained in gas emissions. Using an automated control system to make the propellant neutralization process as much efficient as possible

This direction development outlook A possibility to use the neutralization unit for industrial and non-space applications, taking into consideration the thermal decomposition advantages as well as mobility of the unit. Analysis of the market of industrial liquid and vapor wastes neutralization services and search for potential customers of the neutralization unit.

FINANCIAL AND ECONOMIC COMPONENT OF TERRESTRIAL SEGMENT OF SATELLITE COMMUNICATION SYSTEMS: FEATURES OF FORMATION AND USE

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Satellite communication systems are extremely important for the formation of telecommunication networks, data transmission, monitoring, earth remote sensing, position finding etc. A number of following factors complicates the process of their development and functioning, namely:

- nonavailability of mobile cellular networks within certain territories;
- geographical features complicating a process of cabling;
- heavy expenses connected with the development of such systems.

Satellite communication systems are very serviceable (their reliability is more than 99.8 %) as they have wide signal coverage and work the clock round. Data of the communication systems involve both space segments and terrestrial ones. In turn, terrestrial segment involves antenna assembly, equipment to create channels, transmitting-receiving equipment, commutation equipment, peripheral equipment, power system, control system, and troubleshooting system.

Financial and economic component as an integral part of general requirements for the equipage of satellite communication systems being calculated on the basis of optimizing design cost, purchase of components, assembling as well as operation depends upon:

- frequency coverage (P-, L-, S-, C-, X-, Ku-, K-, Ka-, V-);
- satellite orbit (signal coverage);
- supporting and turning arrangement (mechanical, programming);
- geometry (reflector diameter);
- reflector type (axially symmetric, offset, phased array);
- climatic operation zone (design styles);
- power of transmitting equipment;
- power of channel-developing equipment (modems, coders, decoders);
- services rendered by satellite communication system (GPRS, radiotelephony, TV broadcast, navigation, earth remote sensing, multimedia);
- volumes of data transmission and its rate;
- technical effectiveness of the system (manufacture, operation, serviceability);
- systems of error-rate performance;
- reliability (service life, competitiveness, lasting properties).

Financial and economic component depends directly on specifications of satellite communication systems; determines expediency of the systems development at the level of technical parameters; forms a level of their competitiveness in the world telecommunication market. Total cost should reflect integrally each stage of the system design and approach differentially assembling of composite knots (modules) of satellite communication system taking into consideration service packages and coverage areas.

INTEGRATED X-BAND IRRADIATION SYSTEM FOR RECEPTION OF INFORMATION FROM ARTIFICIAL SATELLITES OF THE REMOTE SENSING EARTH

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Currently orbital flight vehicles (OFVs) of earth remote sensing (ERS) located in low orbits are dominating in the field of services by OFVs. To transfer fast-track communication flow of data obtained from earth remote sensing within microwave band and optical band to earth terminal, enhanced frequency X-band (7.9-8.5) GHz is applied.

Taking into account the fact that OFVs of earth remote sensing are in vision of earth terminal of information reception (4-22) minutes it is required to track motion trajectory of satellites and receive information flows simultaneously.

Monopulse technique to shape signals controlling OFVs is one of such techniques. The approach has been used to design integrated exciting antenna assembly consisting of integrated X-band of exciting unit involving five helix feeds and wave-conducting two-channel (E is polarization plane; H is polarization plane) of SHF route. The SHF route consists of circular waveguide, wavelike polarization selector, and wavelike polarizer.

Four exciters, placed orthogonally, develop channel-creating system for azimuthal plane and angle containing plane.

Moreover, they perform a function of information channel. 5th exciter is purely informational. Summary and differential device designed microstriply integrates signals by exciters into information channel directing them to SHF route. Orthogonal channels form differential signals to control antenna system in two orthogonal planes according to azimuth and elevation angle.

Such a constructional decision makes it possible to optimize information channel as well as channels controlling antenna system.