

TABLE OF CONTENTS

MATTERS of ELECTRO MECHANICS

A.B. Zacharenko, S.A. Martynova

(‘VNIEM Corporation’ JSC)

CHECKING CALCULATION TECHNIQUE for SYNCRONEOUS ELECTRICAL MASHINERY with ELECTRO-MAGNETIC REDUCTION 3

A new mathematical model for magnetic flux distribution which was created on the base of the network theory and a technique for the checking calculation are proposed for new technical solutions in the field of the synchronous electrical machinery with electro-magnetic reduction. The proposed technique takes into account design features of the synchronous magneto-electrical and reactive machinery.

Key words: technique, checking calculation, electro-magnetic reduction.

A.B. Zakharenko, S.A. Martynova

(‘VNIEM Corporation’ JSC)

SELECTION of the BASIC ARCHITECTONICAL RATIOS in the ACTIVE PART of the ELECTRO-MAGNETIC MASHINERY with ELECTRO-MAGNETIC REDUCTION 7

For electrical machinery with electro-magnetic reduction the most optimal ratio of stator teeth number and rotor pole pairs was obtained on the basis of EMF maximization. The formula was derived for coefficients of some ‘z’ and ‘p’ ratios to find the best. The obtained result was analyzed in order to detect relation between EMF and MMF harmonics.

Key words: electromotive force, magnetomotive force, winding coefficient.

V.P. Vereshchagin, A.A. Mikhaleiko, A.V. Rogoz, I.G. Rukovizyn, T.N. Savinova, A.V. Spirin

(‘VNIEM Corporation’ JSC)

EVALUATION of DYNAMIC PROCESSES in the SYSTEM of MAGNETIC SUSPENSION 13

Mathematical models of several component units of magnetic suspension system and the whole system were analyzed. These models can be used for analysis of their dynamic properties.

A complex operation unit consisting of an electromagnet and an output pulse amplifier is presented as a simple a-periodical element. Transient and frequency characteristics for a virtual system are specified in illustration.

Key words: magnetic suspension system, simulation, transient and frequency characteristics.

SPACE ELECTRO-MECHANICS. SPACE CRAFTS

A.D. Belenkiy, V.N. Vassilijev, M.E. Semenov

(‘VNIEM Corporation’ JSC)

TEST DIAGNOSTICS of EXCESS FLYWHEEL SYSTEM 25

Control algorithms for the excess flywheel systems are proposed to be used for test diagnostics of the motor-flywheel. Test procedures for separate motor-flywheel, for groups of motor-flywheels and for the system in whole are developed. Test algorithms are providing minimization of the exciting moments which effect space craft.

Key words: space craft, motor-flywheel, control moment, direction cosine matrix, diagnostics, test signal.

V.D. Dvurechenskiy, P.P. Telepnev, A.U. Fedotov

(‘VNIEM Corporation’ JSC)

DIPOLE ANTENNA with ELLIPTICAL POLARIZATION in RADIO SYSTEMS of SPACE CRAFTS 29

With the help of electro-dynamic simulation a possibility of optimization of elliptic coefficient of the dipole antenna with elliptical polarization is proved.

These antennas integrate on informational radio systems of dm-diapason in the ‘Canopus-V’ and in the Byelorussian space crafts.

Key words: space craft, dipole antenna, elliptical polarization

TECHNIQUES for TESTING of PRODUCTS and EQUIPMENT

V.Ya. Gecha, E.A. Kanunnikova, I.A. Meshikhin, I.I.Y. Pugach

(‘VNIEM Corporation’ JSC)

MATTERS of CREATION and VERIFICATION of DYNAMIC MODEL of the METEOR-M SPACE CRAFT (SC) №2 at the INJECTION STAGE 35

Problems at the stage of injection of the Meteor-M №2 SC by creating of dynamic models are researched including creating of models of separate SC subsystems, their verification corresponding to test results, creating of an integrated dynamic SC model on the base of superelement method, as well as reducing of this model according to the Craig-Bampton Method for simultaneous load analyses.

Key words: space craft, dynamic model, finite-element method, superelement method, condensed model, simultaneous load analysis, mass and stiffness characteristics.

L.I. Eremin, I.Yu. Pugach, I.A. Meshikhin

(‘VNIEM Corporation’ JSC)

EXPERIMENTAL DETERMINATION of the PARAMETERS for SOLAR BATTERY UNFOLDING TECHNIQUES 43

Experimental determination of the parameters for SC (space craft) solar battery unfolding techniques is presented. This method enables to determine dumping and stiffness characteristics of the unfolding technique for further mathematical simulation of the solar battery unfolding.

Key words: space craft, solar battery, unfolding techniques, stiffness, viscous friction.

A.O. Grabilin, B.I. Zubrenkov, M.V. Pustobaev, A.D. Sudomoev, A.V. Shmatkov

(‘VNIEM Corporation’ JSC)

EVALUATION of LOADS on the SC (SPACE CRAFT) EQUIPMENT by EFFECT of SHOT SHOCK PULSES 47

The parameter set was considered which defines process initiated by pyrotechnics of SC separation subsystems. There are initial parameters of shock process, i.e. shock oscillogram (acceleration amplitude and time relations), as well as results of row data processing when applying shock spectrum functions, bandpass filtering, Fourier spectrum. Theoretical and experimental difference between the mentioned parameters is presented, the area of their efficient application is defined. On the base of the component data obtained along three directions, the shock spectrum of the load vector was calculated.

Key words: applied shock, test operation, calculation, shock spectrum, Fourier spectrum, oscillogram.

ELECTROMECHANICS and SOCIAL and ECONOMIC DEVELOPMENT of the COUNTRY

V.A. Burov, S.V. Zhuravlev, V.B. Lapshin, A.V. Syroieshkin

(Federal state budget institution ‘Institute of applied geophysics named after the member of the Academy of Sciences E.K. Fedorov’, Moscow)

V.A. Shuvalov, A.A. Yakovlev

(Federal budget unitary enterprise ‘Central scientific-research institute for machine-building industry’, Korolyov, Moscow Oblast)

GEOPHYSICAL PROCESS MONITORING PROGRAM and SPACE SYSTEMS BUILDING TECHNOLOGY in the PROSPECTIVE GEOPHYSICAL ENVIRONMENT MONITORING SYSTEM 53

Possibility of global and systematical geophysical environment monitoring by means of space systems is considered. It will enable to obtain initial and numerical data for creation of working process models for predictive environment modeling. The justification of parameter structure and the characteristics to be defined are presented. A conceptual idea of information system for geophysical environment monitoring is proposed. The system shall include six space craft groups which have specific application focus and physically similar mission area.

Key words: geophysical environment, Sun, near-Earth space, ionosphere, magnetosphere, spacecraft, monitoring.