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KOCHIASHVILI, TEIMURAZ T.

**DIAGNOSTIC AND FORECASTING OF TECHNICAL
SYSTEM'S STATE BY MEANS OF MACHINE CHECK**

05.02.03 – *Driving Gear Systems*

A B S T R A C T

of the Dissertation submitted
to competition of a scientific degree of
Candidate of Technical Sciences

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The Dissertation is executed on the Chair of “Theoretical Mechanics” № 4 and the faculty of “Technical Diagnostic and Expertise of Construction Design” № 122 of Georgian Technical University.

Scientific supervisor:

TSIKARISHVILI, MALKHAZ A.
Doctor of Technical Sciences, Full Professor

KIPIANI, GELA O.
Doctor of Technical Sciences, Full Professor

Official opponents:

RUSADZE, TAMAZ P.
Doctor of Technical Sciences, Full Professor

CHANTURIA, NODAR E.
Candidate of Technical Sciences, Associate Professor

Public defence of the Dissertation will take place on December 26, 2006 at 13³⁰ p.m. at the sitting of the T05.02N8 Dissertation Board of the ATsSU.

Address: TsSU, Room 101, Building I. 98, Akhlagazrdobis Gamziri,
4614, Kutaisi, GEORGIA.

The dissertation can be accessed at the TsSU scientific library.

The abstract has been sent on November 24, 2006.

Academic Secretary of Dissertation Board,
Associate Professor

OTSKHELI, VALERI N.

GENERAL CHARACTERISTIC OF WORK

Topicality of the work. Diagnostic and forecasting of the technical systems position is a result of scientific-technical progress as regards the methods of calculation accuracy. During the constructions and machines exploitation exist different damages, appear a cracks, after corrosion decrease structural section, take place other defects which decrease a possibilities of construction's working. Hence it is necessary diagnosed on the suitability of construction and forecasting damages by means of control.

The center of diagnostic of technical systems makes an analysis of information that is received by sensors that have a regular connection with the verifiable object. As the lasts years statistics shows in spite of used emergency measures, over the loss of integrity of construction, a rise of disastrous effects both on the Earth and waters and air is cause of greatest material damage and a thousand human victim. Thereby explained necessity of control systems. Every year in up-tempo increase a substitution of human' sense organs by sensors, ensuring of constructions and technological lines by these technological means. The present tense considered as a following stage of machine-energetic and data-computer revolution.

Based on aforesaid the present work "Diagnostic and Forecasting of Technical System's State by Means of Machine Check" is an actual.

The aim of the work. Working out of effective system of machine check of diagnostic and forecasting of technical systems.

Scientific novelty of work:

- working out defect mode originated in technical systems, the reasons, caused break-up and classification of defects;
- analyzed a mechanism of stressedly-deformed state and break-up of technical systems;
- working out the means of machine check for diagnostic and forecasting.

Practical value of work. By realized complex researches achieved a result that give a chance to create the system of machine check for diagnostic and forecasting of the technical system's state and forecasting of their brake-up.

These systems are used for forecasting of damages in machines and mounting.

Practical realization of work. Working outed method, algorithm and program are received by different organizations. Corresponding acts apply to work.

Reliability of scientific results determined well-founded variants that are in the basis of algorithm and confirmed by the accuracy of calculation estimations and coincide with coincide with results of theoretical and experimental researches received by different authors.

Approbation of work. The main outcomes of the work have been submitted and considered at the Republic opened scientific conference "Building and XXI Century" (Tbilisi, 2005).

- At the scientific seminar of the chair "Technical Diagnostics of Damages and Constructions" of the Georgian Technical University (Tbilisi, 2005);
- At the scientific seminar of the chair "Engineering Mechanics" of the Georgian Technical University (Tbilisi, 2005);
- At the scientific-technical jubilee conference of Georgian Road-Transport Institute (Tbilisi, 2005);

- At the expanded seminar of Kutaisi Niko Muskhelishvili State Technical University (Kutaisi, 2006).

Publications. The main outcomes of the work have been published in 6 articles and 4 thesis.

Volume of Work. The Dissertation consists of the introduction, 4 chapters and the basic conclusions. The list of the used literature includes 139 titles.

The work is stated on 150 pages of the computer text, contains 57 figures.

GENERAL CHARACTERISTIC OF WORK

1. Studied the kinds of deficiencies emerged in technical sciences, made their classification, discussed modern experimental methods of detecting the first cracking and damaging process in technical systems;
2. Proved that properties of materials depend on their deformation speed, but the abrasion itself may pass while less tensioned at firmness limit, when action is extended in time during loading process;
3. Theoretically studied crack spreading mechanism in linear sticky-flexible setting during long static loading, crack widening mechanics, in real materials the effect of plastic current localization for ordinary tear cracks must be stronger as crack speed causes material deformation speed acceleration at its tip, what itself leads to plastic limit rise;
4. Quality and quantity property determination of an object is considered to be the marks of technical state, elaborated constructing and analyzing methods of technical diagnostic model, the principles of parameter selection and diagnosis indicators;
5. Made the classification of automatic means of control, main marks by which the classification was conducted;
6. Cultivated structural schemes of control logical devices, the disposition schemes of ciphering devices and impulse shooting, unique scheme of control automatic system in technical system exploit condition and automatically controlling block-schemes of accident foreseeing;
7. Determined control system quality and discussed the examples of automatically controlling system usage.

The basic results of the dissertation are published in the following works:

1. Vanishvili N., Kochiashvili T., Lejava G. Calculations in Shift of Gentle Membranes and Plates Weakened by right-Angled Cuts. International Scientific Journal "Problems of Applied Mechanics", №2(15). – Tbilisi, 2004. –pp. 100-107. (in Russian)
2. Kochiashvili T. Apply of Physical Methods at Various Types of Loading and Researching for Diagnostic's Purpose. International Scientific-Technical Conference Dedicated to the 70-year rector of the Auto-Road Institute Murman

- Edilashvili, №2. –Tbilisi, 2005. -pp.122-126. (in Russian).
3. T. Kochiashvili, M. Cikarishvili. Cultivating Control Systems Automatically Foreseeing Accidents in Extreme Conditions. Scientific-technical journal "Energy".
 4. Todua M., Kochiashvili T., Dolidze K. Steadiness of the Homogenous Plate with Fastened Longitudinal and Supported Transvesal Sides at the Single-Axis Compression. International Scientific-Technical Conference Dedicated to the 70-year rector of the Auto-Road Institute Murman Edilashvili, №2. –Tbilisi, 2005. -pp. 160-161 (in Russian).
 5. Tsikarishvili M., Kochiashvili T. Estimation of Diagnostics of Technical Syatems and Fitness for Work. International-Scientific Journal "Problems of mechanocs", №3(20). -Tbilisi, 2005. -pp. 103-105 (in Russian).
 6. Tsikarishvili M., Lagundaridze G., Tsakadze A., Koniashvili P., Kochiashvili T. The Development of the systems for Automatic Control over the Prediction of Failures Occuring in Extreme Cases. Scientific-Technical Journal "Energy", №1 (37). – Tbilisi, 2006. -pp. 103-105. (in Gergian).