Of particular interest for biology and medicine is modeling of living systems in extreme conditions, that allows to more adequately assess the dynamics of the severity of the patient and to predict the outcome of the disease in the process of clinical and laboratory monitoring.

In ecology and medicine under extreme conditions understand the impact of external factors that translate a living system in a critical state, the study of which is one of the relevant clinical problems.

For survival in the critical conditions of living system, to adapt, to organize, mobilize, that requires changes in the level of metabolic reactions of the organism. Therefore the mathematical model should be based on perceptions of the general mechanisms of adaptation (adaptation) of living systems to extreme conditions.

The criterion of optimization of the body is considered persistence (homeostasis) or minimal change a limited number of vital parameters.

Conclusion: consideration of specific physiological, immunological and biochemical systems of the body, as well as calculation of external and internal factors leading a living system in extreme condition to describe and analyze functional (reversible) and organic (purchased, the change of the living system and possible ways of its diagnostics and prediction.

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PROCEDURE FOR CREATING DATABASE PARTITIONON THE CHARACTERISTICS OF RELIABILITY OF MECHANICAL ELEMENTS

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The issues of the development of data bank on the base of characteristics of reliability of mechanical elements for the system ASONIKA-K-SCH are studied in the research. The procedure of working up of data bank section by DBCS Oracle is described in the study.

Keywords: radio electronic equipment, reliability, mechanical elements, data bank, ASONIKA-K.

This study (research grant № 14-05-0038) supported by The National Research University - Higher School of Economics' Academic Fund Program in 2014. The effect of mechanical elements (ME) is not taken into account in assessing reliability in radio electronic equipment (REE) in the currently accepted techniques[1]. American Standard NSWC-11[2] contains mathematical models of failure rates of ME, which form the basis of the development of the database section of the system ASONIKA-K-SCH on the base of characteristics of reliability of mechanical elements.

Oracle is used as a database control system (DBCS) in the system ASONIKA-K, so the same DBCS is used when the section of characteristics of ME reliability is developed. Detailed description of the database of the system ASONIKA-K is given in [3,4].

Section structures of database are universal and allow you to add various guides and standards. Database tables contain parameters, symbols and keys to have a link with the main table. The data sets are often repeated, so each set of data in the table has a unique identification number that allows you to save data volume of tables.

Database section is developed to assess the reliability of ME, with the help of which failure rates of mechanical elements will be set. Detailed description of the section structure is given in [5,6].

Database section with ME also has a number of tables, which are common to all classes. This is due to the fact that a number of application parameters and empirical coefficients are repeated for different classes of ME. The table of conversion rates is common to all classes of ME that are based on the standard NSWC-2011[1], as the standard is written in the American system of measures, and the system ASONIKA-K-SCH focused on the user working in the SI system.

Another feature of the database is the independence of the tables of different classes of ME from each other. That means when the data or the table structure of one class are changed, tables of other classes remain unchanged. Obviously, in this case the number of ME classes stored in the DB is almost unlimited and DB can be expanded to any number with the appearance of new classes of ME[3,4]. Example of the database structure of class ME “Filters” is given in [7].

The structure of each class is constructed depending on the mathematical model of failure rate. For example, the failure rate model of the class “Filters” has the form:

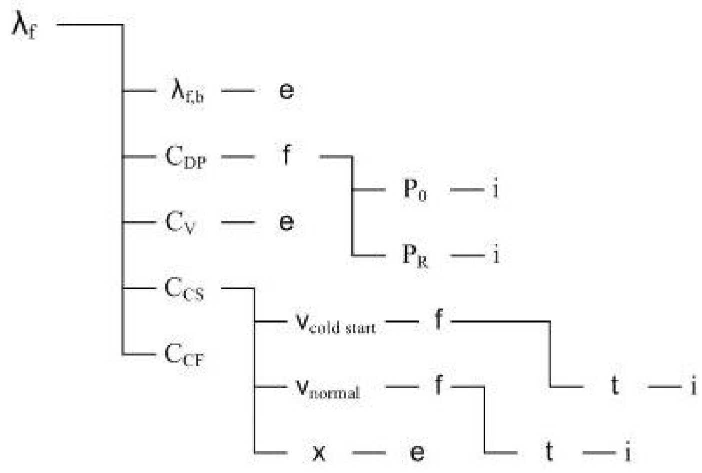
$$\lambda_f = \lambda_{f,b} \cdot C_{DP} \cdot C_V \cdot C_{CS} \cdot C_{CF}, \quad (1)$$

where: CDP is correction factor of pressure; CV is correction factor of the instrument cluster; CCS is correction factor of the effect of the liquid viscosity; CCF is correction factor of the pore size of the filter element and the cyclic rate of flow.

Each correction factor is either contained in the database, or is based on a formula, factors of which are either contained in database or are entered by the user, and in some rare cases have their own formula. Therefore, all data necessary for calculation, are divided into three groups:

- The group of e - factors which are contained in the database
- The group of f - factors which are calculated by the formula
- The group of i - factors that the user enters.

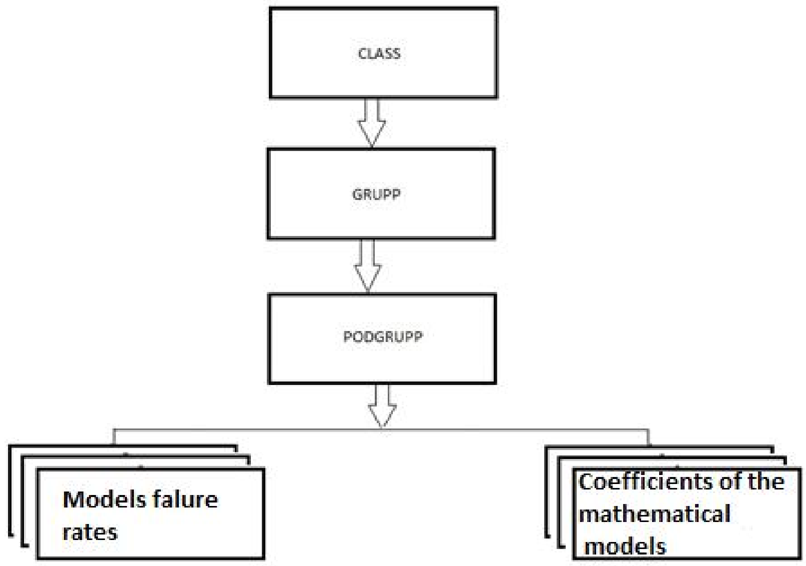
The tree of all factors of this class is created, which is based on the classification above (picture 1).



Picture 1 – the tree of factors of the class "Filters"

The tables of the class included in database system are created on the base of "The tree of factors" (picture 1).

The DB tables have a clear hierarchy (picture 2).

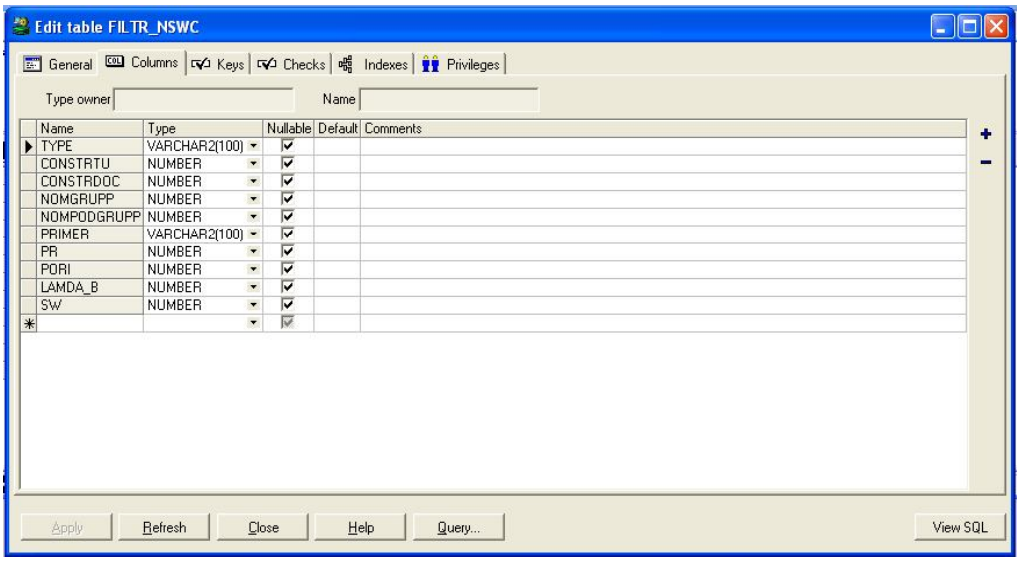


Picture 2 – Hierarchy of DB tables

A list of all classes of the components used in the REE compiled in the main table «CLASS». This table shows strict conformity of component class name with its serial number, which is the main part of the class hierarchy in REE or ME, and SQL- queries, under which the entire set of reference data needed to calculate the failure rate returns from the database. All components are divided into " classes " divided into " Constructive-technological groups " and " Subgroups ", in which there are references to tables with coefficients necessary for the calculation.

Each ME has its own parameter values. Each ME is tied to any group and (or) the subgroup, it is achieved by matching numbers in columns «NomGrupp» and «NomPodgrupp» of main class table and numbers in the tables «Grupp» and «Podgrupp» respectively. All information on the group or subgroup, connected with a particular ME by the method described above. They include basic failure rate λb, basic failure rate in storage mode λsg, etc.

In Picture 3, the main table of class "filters" is given as an example.



Picture 3 - DBCS Oracle: The main table of class "Filters"

As you can see from Picture 3, the name of shortened element type («TYPE»), is stored in the main class table, ME of any class also has a unique number, which is stored in the field «CONSTRTU», which allows you to store several parameters in the database for one ME. Base failure rate for each item is stored in the field «LAMDA_B» and identifiers of groups and subgroups are stored in the fields «NOMGRUPP» and «NOMPODGRUPP». The other fields in this table are subject to change in accordance with the classification of the coefficients of the selected class[8-10].

Thus, the procedure for developing a new section of database for the system ASONIKA-K - SCH involves the following steps:

- Classification of parameters and coefficients in the mathematical model of the failure rate;
- Construction of the "Tree of coefficients";
- Construction of the "Hierarchy of tables";
- Design of a logical model of the database section.

The above procedure can be used as a base for developing database on the characteristics of reliability of ME of other classes, listed in the standard NSWC-2011.

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PHYSICAL EFFECTS AND PROBLEMS IN GAMMA-ELECTRONICS

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The physical effects and problems within the scientific direction "Gamma- electronics (γ- electronics)", which studies the interaction of the electron and positron fluxes with the electromagnetic field in the γ- range of wavelengths, as well as problems of production and the prolonged existence of the electron-positron substance (EPS) with extremely high stored energy released in the process of collective slow annihilation have been concidered. We discusses the possible quantum analogues of classical high-power microwave devices in the interaction of charged particles multipath different sign. The basic stages of work, corresponding to the possible experiment in gamma- electronics with streams of electrons and positrons have been indicated.

Keywords: gamma-electronics, electron-positron substance, electron and positron beams, the method of large particles, the macroscopic quantum theory, Schrodinger and Poisson equations, macroscopic wave function, super-liquidity, super-plasmoid, collective interaction.

1. Introduction

Considered a new scientific direction - GAMMA ELECTRONICS (γ electronics), which explores the interaction of the electron and positron beams with electromagnetic fields in the γ - wavelengths. In scientific monograph [1] formulated a hypothesis about the possibility of prolonged existence of metastable electron-positron substance (EPS) with unique properties: extremely high stored energy released in the process of collective slow