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GRAPHIC-OBJECT INFORMATION SYSTEM "RESEARCH BASE FOR REACTOR MATERIALS SCIENCE"

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There is no doubt that an information system which generalizes knowledge about the properties of reactor materials is needed. However, the databases are not formalized at the present time because of the great diversity of the properties and materials studied and of the methods employed for describing the conditions of tests and for representing the results, which depend on the physical model adopted by the investigator. In this connection, the starting point for creating an information medium could be the development of databases containing factual and graphic information about the testing methods and conditions and investigations, since such information is an attribute of any experimental results that are required for assessing their reliability and interpretation.

An ideology for developing a generalized information system, which could concentrate all necessary data on the conditions of irradiation and testing and methods for creating these conditions and for performing investigations of the properties of reactor materials, has been developed taking into account the needs of specialists in the field of reactor materials science. In so doing, the possibility of a dual approach to information on an experimental base was taken into account:

- on the one hand, the use of information for assessing the reliability of the obtained results (on the basis of accuracy characteristics, determined by specific methods of investigations, and the correctness of the knowledge about the conditions of the tests);
- on the other hand, a well-founded choice of the required conditions of the future irradiation and investigations, taking into account planned conditions of the operation of the material or part being tested, the costs of the experiments, and the ability of the enterprises to perform the tests (of the available methodological base) and experience from preceding investigations.

The information system developed must reflect the progress made at the industrial and academic institutes in the development of an experimental base for reactor materials science, it must generalize the accumulated scientific and technological potential and the experience and knowledge of specialists, and in so doing it must serve as an optimal planning tool.

**General Systems Structure.** The graphic—object system "Research base for reactor materials science" must consist of the following independent knowledge bases (Fig. 1):

- an information-search system on research reactors RÉM, which makes it possible to obtain information about the neutron-physical characteristics of reactor channels, the geometry of these channels, and the conditions of the experiments;
- an atlas of irradiation devices developed for a specific reactor;
- an atlas of shielding chambers, which contains information about the geometry of the chamber itself, the transport possibilities for loading and unloading a part or sample, and the admissible activity of the investigated part;
- an atlas of systems on which the tests in protected chambers are to be performed;
- a catalog of methods for reactor tests (MERI), including methods for irradiating materials in reactors and methods for investigating the materials after irradiation;
- the expert system MATRÉKS, which makes it possible to optimize the planning of experiments on the investigation of the properties of reactor materials and parts and containing the enumerated knowledge bases; and
Catalog of methods for reactor tests
MERI

Atlas of shielding chambers

Expert system MATRÉKS for choosing a location for the investigations

Atlas of research reactors (RÉM)

Catalog of systems for implementing methods in a shielded chamber

Bibliographic database on the properties of materials (with referencing to the measurement method)

Catalog of irradiating systems

Conduct of investigations in a shielded chamber

Conduct of tests and (or) investigations in a reactor

Fig. 1. Graphic-object information system "Research base for reactor materials science."

A bibliographic database containing the results of investigations in reactor materials science that makes it possible to obtain information about sources which contain experience from preceding investigations in the field of interest to the user (in the future, this knowledge base must be converted into an autonomous system -- an information system on the properties of materials that is uniquely related to methods for obtaining these properties).

It is obvious from the layout that in the development process an expanded interpretation of the term "research base" that, in our opinion, is consistent with the main concepts of reactor materials science. A decision was made to create a system that includes information about both the experimental base (reactor systems, shielding chambers) and about the choice of methods and means that make it possible to irradiate reactor materials and to study their processes during and after irradiation.

A systems ideology has now been developed. The preliminary collection of information made it possible to estimate the expected volumes of data and the requirements which the information must meet. Moreover, the following developments are available for separate databases:

- an information-search system MERI (catalog of methods for performing reactor tests of materials and parts used in nuclear technology [1, 2]) has been developed and is in use;
- the structure and software for the information-search system RÉM "Research reactors of Russia. Factual and graphic data and experimental possibilities" have been developed; information on 20 research reactors has been introduced;
- a system of expert assessments for optimizing the choice of a testing site and the shell of the expert system MATRÉKS have been developed, and separate data for working out the final variant have been introduced [3];
- information has been collected and systematized for a database on shielding chambers, the structure of the base has been prepared, and the software is in the development stage.

Development of the remaining parts of the system is planned in the next few years after an expert assessment of all methodological information and more accurate determination of the real status of the development of specific systems. The bibliographic information will be collected by specialists in the field of materials science as the reliability of the experimental data is evaluated.

**Information-Search System RÉM.** The databases developed are now used as an independent program product with specific information possibilities. The structure and possibilities of the database, intended for collection, storage, and dissemination of information about research, test, and power reactors to the user are given below for the example of the information-search system RÉM "Research reactors of Russia. Factual and graphic data and experimental possibilities."

**Analysis of the Subject Field and Structure of the RÉM Database.** The RÉM database contains the following:
- general information about the reactor system as a whole (type, power, number of fuel assemblies, effective operating period, fuel life, etc.);