
Summaries

E. Nikulina, V. Severin

Multicriterion synthesis of reactor facility control systems through minimization of integral quadratic estimations

The mathematical modeling of automatic control systems of WWER-1000 reactor with various regulator types is considered. The linear models of WWER-1000 nuclear reactor thermal power control systems are developed. The results of multicriterion synthesis of thermal power control systems of WWER-1000 nuclear reactor through minimization of the improved integral quadratic estimations has been presented. The linear models of productivity control systems of steam generator SGW-1000 are designed. The identification and multicriterion optimization of productivity control systems of steam generator SGW-1000 with various regulator types are executed.

M. Maksimov, S. Pelykh, O. Maslov, V. Baskakov

Influence of initial data uncertainty upon estimation of the fuel element cladding durability at a variable operation mode

An analysis of the fuel element cladding durability estimation sensitivity to the main regime and design initial core data uncertainty, for a WWER-1000 nuclear reactor operating in a variable loading mode, has been performed.

O. Shugaylo, S. Kostenko, OI-dr Shugaylo, V. Krytskyy, D. Ryzhov, L. Khamrovska

Concerning reassignment of permissible numbers of mechanical equipment loading cycles

Some issues concerning exhaust of NPP mechanical equipment loading cycles have been considered and the main statements of the methodology for reassignment of the permissible numbers of loading cycles and equipment technical state evaluation in cyclical loads have been presented.

S. Azarov, G. Sorokin

Calculation of temperature processes in NPP containment occurred in air crash

The problem on nuclear reactor containment behavior after intensive temperature impact resulted from air crash is considered. The task urgency is to solve the problem of minimizing

the devastating effects of a random crash or acts of terrorism. The developed models allow simulating the effects of other impacts: the explosive and dynamic loads, industrial accidents, etc. Numerical solutions of these problems provide with quantitative assessments of heat safety barriers of a nuclear reactor.

V. Shevel, Yu. Lobach, Yu. Nesteruk, I. Khomich

Assurance of WWR-M research reactor radiation safety monitoring

Both description and operational experience of the WWR-M research reactor radiation protection and monitoring system are presented. The list of radiation factors at the reactor normal operation is given and the main activities on radiation safety assurance are established. Statistical information on staff exposure and radioactive aerosol releases is shown. Tasks and the structure of the emergency response system are described. The set of technical solutions aimed at modernization of the radiation protection system is presented.

A. Korolyov

Use of the injector in the ECCS system to improve its functional reliability

The design decision has been proposed to improve the emergency core cooling system (ECCS) operational reliability. The calculations have been carried out demonstrating the efficiency of using a water-watered injector to heat water supplied to the reactor and increase its pressure.

S. Gabelkov, R. Tarasov, N. Poltavtsev, J. Kurilo, E. Ledovskaya, F. Belkin

Phase composition evolution in heat treatment of co-precipitation of zirconium, yttrium and europium hydroxide

The results of phase composition change in co-precipitated hydroxides of zirconium, yttrium and europium in heat treatment are presented. The scheme of phase evolution is provided from complex amorphous hydroxide to amorphous oxide with the subsequent crystallisation of the only and nanosized phase of cubic zirconium. All the europium oxide constituted amorphous zirconium at 400 °C. It creates objective prerequisites for including americium oxides into a matrix of zirconium oxide at the temperature 300 °C lower than in traditionally known formation of a cubic solid solution.

V. Bogorad, T. Lytvyns'ka, A. Nosovsky, O. Trofimova

General approaches to develop radiation protection program in transport of radioactive materials

There are presented the scientific and technical effort results performed by experts of the State Scientific and Technical Center for Nuclear and Radiation Safety upon the request of the State Nuclear Regulatory Committee of Ukraine. The structure and the main requirements for developing a radiation protection program in transport of radioactive materials are considered on the basis of the Ukrainian regulations and IAEA recommendations.

Ali Kalvand, I. Kazachkov

Problem of corium melt cooldown in the containment in passive severe accidents protection systems. Part 2

This paper in two parts is devoted to an analysis of the problem of corium melt interaction with water and low-melting temperature blocks in the passive protection systems against severe accidents at the NPP, which is of high importance for substantiation of the nuclear power safety, for building and successful operating of the passive protection systems. In the third-generation reactors the passive protection systems against severe accidents at the NPP are mandatory, therefore

this paper is of importance for the nuclear power safety. A few such systems have been considered, which are in different stage of completeness. An analysis of the unsolved thermal hydraulic problems, which solution might help to improvement of the current systems or development of the new, more effective ones has been provided. The ways for solution of the stated problems and the methods for their successful elaboration were discussed. The mathematical models developed and the analysis performed in the paper might be helpful for design of the passive systems of the corium melt retention inside the containment after a corium melt eruption from the failed reactor vessel. Part 1 of this article was published in No. 1/2009 of this journal.

A. Nosovsky, V. Vasylychenko, A. Klyuchnikov

Management of nuclear knowledge – necessary condition to implement the energy strategy in Ukraine

The actual problems concerning retention of nuclear knowledge have been considered, the necessity to create a national nuclear knowledge management system in Ukraine based on IAEA recommendations and the practice of other countries has been demonstrated. General organizational and methodological recommendations on creating such a system have been provided.