

It follows from the performed analysis that the calculation methods used in integral codes for modeling the fission product aerosols behavior give a significant error in calculating the distribution function for large particles in the case of using particle size spectra for which the ratio of particles volumes from neighboring fractions is equal to or greater than two. For more detailed aerosol modeling particle distribution function, it is necessary either to use an essentially larger number of fractions or to develop more efficient new calculation methods.

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## **IMPROVING THE RELIABILITY AND SAFETY OF NUCLEAR POWER PLANTS**

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### **Introduction**

An essential requirement for a nuclear power plant is to ensure conservation of nuclear and radiation safety. NPP safety relevant today the problem is not only in Russia, but all over the world. During normal operation of nuclear power plants do not pose a risk to workers, the public and the environment.

### **Problems and Solutions**

The safety of nuclear power plants may affect emergencies (incidents) and accidents related to:

- The human factor
- Errors in the design
- Natural disasters
- The problem of radiation safety

- The problem of radioactive waste disposal

Next, I would like to focus on each problem and solutions a little bit more.

**The first problem is the human factor.**

The human factor is manifested at all stages of the life cycle of nuclear power plants. So, we must try to create a system that minimizes human risks. World experience shows that the best form of training and retraining of specialists is the organization of educational process on the basis of simulators.

**The second problem is an error in the design.**

Lack of safety culture was inherent not only the operational phase but also during the design and engineering design. Cornerstone in the field of nuclear safety should be a "design principle", which consists in the use of new design techniques and improved administrative procedures.

**The third problem is the natural disasters.**

Source of random events that can lead to accidents at nuclear power plants can be natural influences. Preventing failures and violations of safe operation is ensured by choosing the safe area of the NPP, the use of conservative design principles, the availability of quality assurance system at the siting, design, construction and operation, as well as the safety culture.

**The next problem is to ensure radiation safety.**

The problem of nuclear and radiation safety can be divided into two parts. The first - is to ensure trouble-free operation of current nuclear power facilities and other potential nuclear and radioactive facilities. The second global issue of nuclear and radiation safety - this is a problem heritage "of the Soviet atomic project." To resolve these issues, licensing of all stages of design, construction and operation of such facilities; also need new methods for processing and storage of spent nuclear fuel (SNF) and radioactive waste (RW), new methods of remediation of contaminated areas and so on.

**A final problem is the problem of radioactive waste disposal.**

Radioactive waste - is nuclear materials and radioactive substances, further use is not provided.

Methods of disposal of radioactive waste:

- Transmutation
- Disposal of radioactive waste in the oceans
- Conveyor disposal of radioactive waste in the bowels
- Sending waste into space

**Conclusion**

In such a way to improve the reliability and safety of nuclear power plants must comply with a set of specific rules. Also, I want to say that in our country security is at a very high level. Russian NPPs are operated safely and securely. On the criterion of the reliability of the nuclear power plant Russia ranked second in the world among countries with the development of nuclear energy, ahead of such developed countries as the USA, UK and Germany.

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## ALGORITHMS OF FAULT-TOLERANT CONTROL OF SWITCHED-RELUCTANCE DRIVE

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The research of fault-tolerant control of a switched-reluctance drive operating in emergency modes is very urgent owing to additional requirements to technical equipment that is integrated in various dangerous facilities such as nuclear, military, chemical, medicine, transport, petroleum etc. The article focuses on the modern switched-reluctance electric drive (SRD) which is very promising and gaining in popularity in industrial applications. Malfunction of the equipment and large-scale economic losses occur in the case of emergency mode of an electric drive. Nowadays it is necessary to improve reliability and fault-tolerance of electric drives. The increased requirements to fault-tolerant control of electric drives lead to the necessity to design some special control algorithms with full or partial functional recovery abilities. Thus, the problem associated with the design of fault-tolerant control algorithms of switched-reluctance drive is the purpose of this article.

In general case the control of switched-reluctance drive is carried out by series connection of phases on the basis of the position sensor signals. Herewith the overlap of angles of phases is absent and the commutation control is carried out as shown in Fig. 1.

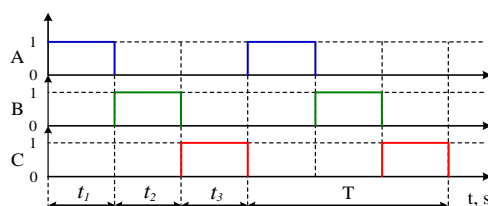


Fig. 1. Commutation control diagram under symmetric single switching of phases.