RELIABILITY AND SAFETY OF COOLING SYSTEMS OF IRT-T REACTOR

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At present, close attention has been devoted to the reliability and safety of nuclear power plants, small modular reactors, and research reactors compared to the past. This was because of accidents that happened at Three Mile Island (TMI), the Chernobyl Nuclear Power Plant, and Fukushima. Because the cooling systems of research reactors play a big part in how they work, it would be good for reliability and safety tests to be done on them.

The function of a power reactor installation is to extract as much heat of nuclear fission as possible and convert it to useful power, generally electricity. The coolant system plays a pivotal role in performing this function. Research reactors have very simple heat-removal systems, as their primary purpose is to perform research and not generate power. In research reactors, coolant is run through the reactor, and the heat that is removed is transferred to ambient air or to water without going through a power cycle. In this presentation, the cooling system of IRT-T reactor is considered. The Reactor Coolant System (RCS) of an IRT-T reactor consist of primary and secondary loops [1]. The primary circuit which consists of pumps, heat exchangers, fittings, pipelines and holding tank. To cool the primary circuit water in the heat exchangers, process water of the secondary circuit is used. The second circuit includes a cooling tower cooling tower of sprinkler design with the secondary coolant flow rate up to 2100m ^{3} /s, four pumps, five heat exchangers, and a system of circulating water supply pipelines [2].

For the IRT-T research reactor equipment reliability modeling and optimization, a new methodology will be proposed that will make use of comprehensive, up-to-date commercial software tools. The idea behind this proposal is that applying the combination of specific equipment optimization and reliability software packages will have several advantages over the commonly used methods.

Fouling should be analyzed as it has a significant impact on maintenance issues. Up to a 30% decrease in maintenance costs can be achieved annually by applying advanced reliability results and determining reactor equipment failure causes. In these analyses, the causes of failure are looked into, the future chances of failure are predicted, cleaning plans and schedules are made, and reliability and maintainability are calculated.

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РАЗРАБОТКА ПРОГРАММНОГО МОДУЛЯ ДЛЯ РАСЧЕТА КИНЕТИЧЕСКИХ ПАРАМЕТРОВ ИМПУЛЬСНОГО ГРАФИТОВОГО РЕАКТОРА

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Реактор ИГР [1] является исследовательским реактором с уникальными нейтронно-физическими характеристиками. Для сопровождения реакторных экспериментов основным аппаратом расчета нейтронно-физических параметров является программный комплекс MCNP6.2 [2]. При проведении относительно длительных пусков (от 10 с до 100 с) с реализацией большого энерговыделения в активной зоне ИГР для корректного