ON RELIABILITY OF SYSTEMS WITH PERIODIC MAINTENANCE UNDER CONDITIONS OF RARE FAILURES OF ITS ELEMENTS

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There is investigated a model of the system with the highly reliable elements, in which the periods of functioning are changed by the periods of maintenance. System must be operational only in the periods of functioning although the restoration in these periods is not produced. The system is completely restored in each period of maintenance.

Examples of such systems are aircrafts, reusable spacecrafts, as well as discrete-continuous systems. So aircrafts in the flight are carrying out their flight mission. After landing their complete maintenance is carried out and aircrafts are ready to fulfill their flight mission. In nuclear power plant users as a rule have no access to reactor between periods of planned maintenance. At the time of maintenance reactors can be adjusted and renewed to continue their mission.

For these systems the periods, where the system works and fulfills the assigned functions are changed by the periods, when system is turned off and maintenance is produced. The restoration of all failed elements as well as the elimination of all faultinesses accumulated during working period is produced only in the second period and it manages to end up to the moment of the start-up of the system. In the second period the reliability of operational elements is not changed. After gluing together the operating cycles of the system, we will obtain the model of the system with the periodic instantaneous maintenance.

Since the elements of system are highly reliable, the reserve of system is rarely exhausted during each period of functioning. So the probability of the system failure in every single period of functioning is very small (converge to zero) and reliability of system may be analyzed by the apparatus developed for systems with continuous maintenance and fast restoration.

Thus the estimation of the reliability of system with the periodic maintenance, where there are no restorations in the intervals of functioning, can be and will be actually accomplished by the apparatus, developed for the restorable systems with fast restoration. It sounds paradoxically, but this is actually so because the elements of system are highly reliable, the intervals of functioning have relatively small duration and the point interval of maintenance follows them.

The basic purpose of the study is the creation of mathematical support for the assessment of indices of failure-free performance, maintainability and readiness factor of systems with periodical maintenance, fast restoration and reliable elements

The indices of failure-free performance include the mean operating time to the first system failure, the mean operating time between system failures, the distribution function of the time to the first system failure, and distribution function of the time between system failures.

The indices of maintainability and readiness factor include distribution function of the system restoration time, the mean value of the system restoration time, and the system readiness factor.