RELATIONSHIP THE PROCESSES OF THE RADIATION DEFECT FORMATION AT PROTON IRRADIATION WITH MARKOV CHAINS

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Development of physical and mathematical models, computational algorithms, objects of study allows us to describe many phenomena.

We examine the processes of radiation defect formation in solids irradiated by protons and the features of computer simulation of cascade-probability functions (CPF) and radiation-induced defects, the establishment of the relation of these functions with Markov chains and Markov processes. In the interaction of charged particles with matter on the way their movements are continuous energy losses, which lead to a strong dependence of the energy spectra of incident particles themselves and primary knocked atoms from the depth of penetration. The interaction path on PVA formation essentially depends on the energy. We have developed a physical model of the interaction of the charged protons with materials. The mathematical models of the cascade-probability functions were presented, taking into account the loss at proton irradiation. There were conducted the CPF calculations depending on the number of interactions and the depth of particle penetration. It was presented a calculation model of PVA spectra and concentration of radiation defects, the calculations were produced. It was shown the relationship of the processes of the radiation defect formation at proton irradiation with Markov chains. The recurrence relations, from which the analytical expressions for the cascade-probability functions are derived, there were obtained from the Chapman-Kolmogorov equation. The expression for the spectrum of PVA can also be written in the form of the Chapman-Kolmogorov equation. The integrand contains a product of probabilities, which are the transition probabilities for the Markov chain.

Keywords: *cascade-probability functions, defects, model, Markov processes, Mileage of interaction.*