THRESHOLD PROCESSES IN TECHNICAL SYSTEMS WITH URANIUM AND THORIUM

V.V Knyshev, S.V Bedenko., S.V Gritsyuk
National Research Tomsk Polytechnic University
Russia, Tomsk, Lenin ave., 30, 634050
E-mail: vvk28@tpu.ru

Accuracy of neutron and fuel composition nucleus interaction cross-section estimation is a prime consideration for secure evaluation of the uranium-thorium NFC effectiveness. Currently, there are many diverse experimental and theoretical nuclear data. They are completely represented in the following libraries of evaluated nuclear data – ENDF (USA), JEFF (Europe), JENDL (Japan), TENDL (RF), ROSFOND (RF).

However, information about threshold neutron reactions on 232Th nuclei is practically absent at all subsisting and evaluated nuclear data basis but available values of efficiency and profile differ from arrangements.

In the work the results of resources and numerical experiments are quoted. These results are focused on the determination of the nuclear physics and radiation characteristics of core and thorium storage system. Requirement for correction of nuclear constant which is used in calculation for core and thorium storage system criticality is shown.

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REFERENCES

SIMPLE PHYSICAL MODELS IN PRACTICAL APPLICATIONS FOR NEW ENGINEERING TASKS

V. Mikhaylov1,2,3, V. Kushpi2, S. Kushpi2, S.N. Liventsov1
1National Research Tomsk Polytechnic University,
Russia, Tomsk, Lenin Avenue 30, 634050
2Nuclear Physics Institute, Academy of Sciences of Czech Republic,
Czech Republic, 250 68 Řež,
3Czech Technical University in Prague,
Czech Republic, Prague, 166 36
E-mail: mvserg@yandex.ru

There is a traditional opinion that modern physics can evolve only by using more and more complex mathematical and physical models. In practice, this often appears as division of a single common problem to multiple small problems with complex description. In this case, complete picture of actual process can be lost in a huge amount
of practically unimportant details. Sometimes the simplified description is better, when more understandable global
description is more preferable compared with more precise, but also more complex for understanding physical models.
We describe a few simple models that can be applied in the practical engineering to understand the basic behavior of
modern semiconductor devices.

Various types of detectors with internal amplification of weak signals produced by ionizing radiation
are used in modern physical experiments. There is a large class of gaseous detectors and presently widely used
semiconductor avalanche photo detectors (APDs) [1]. Avalanche physical processes in semiconductors are more
complex to describe and understand compared with simple Tungsten model for avalanche in gaseous detectors.
However, it is not necessary to solve the fundamental system of partial differential equations to understand the
processes in this type of detectors. Well known by radio engineers common conception of feedback can be applied for
simple description of such a complex system [2]. Simple feedback model can be used for the classification of different
types of modern APDs and for description of its internal processes. Simple “Logistic” model is applied to explain how
the rising time of avalanche depends on the probability of avalanche occurrence in the APD. To understand how carriers
generation-recombination processes are affected by traps created during irradiation and self annealing in
semiconductors, one can apply a simple model based on assumption of a single traps level and a single lifetime of
carriers on this level [3]. Interpretation of results obtained for a few types of commercial APDs is presented. Example
of method of the detector noise introduction applied to the detector SPICE model is discussed. In addition, simple SPICE
model describing gain coefficient and applicable for transient analysis of APD is proposed.

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FINANCIAL INSTRUMENTS PORTFOLIO OPTIMIZATION
M.K. Moshenetc
National Research Tomsk Polytechnic University,
Russia, Tomsk, Lenin Avenue 30, 634050
E-mail: mari.moshenets@mail.ru

Nowadays investment of money is one of the most popular ways of income acquisition. One of the most urgent
tasks of financial investment is analysis and prediction of expected profit and risks. Due to this, analysis and prediction
of expected profit and risks suffered by an investor in the course of portfolio management is becoming topical as well.

The foundation of portfolio investment is allocation of investment money between various groups of assets,
since it is impossible to predict fulfillment of two conditions at the same time: high reliability and maximum yield.
Depending on the tasks and objectives, investors analyze the stock market situation and reasons that influence the stock
price. The process of portfolio construction implies indicating the most appropriate portfolio structure for a certain type
of securities; the percentage ratio of financial instruments is defined as well. Therefore, a portfolio represents a set of
financial instruments integrated for implementation of investor’s purposes, profit growth and mitigation of damages.