PROSPECTS FOR IMPLEMENTING COMPUTER VISION, ROBOTS AND DIGITAL TWINS IN NUCLEAR PHYSICS RESEARCH AT RFNC – VNIITF

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The paper presents an overview of the recent works aimed at automatization and digitization of the nuclear physics experiments at RFNC-VNIITF. Two promising trends are considered. The first one implies the automated computation of tracks on mica films of solid-state fission detectors, which includes optimization of the recorder preparation technology and microscopic imaging method, deep learning of the convolutional neural network algorithm, and preliminary estimation of metrics. The second trend provides for creation of the robotized and digitized technology of assembling and disassembling of core using the critical assembly machine FKBN-2. This includes the development of a robotic system and a digital twin (digital model) of the breeding system assembling technology. The digital twin is designed for modeling the core assembling sequence, calculating criticality parameters and forming a model for subsequent robotized assembling and disassembling. The current development status is reviewed, the robotized system is described, and information exchange software is presented. For both trends the development paths are outlined and the expected results are indicated.

References

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