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MODERN FACILITY FOR NEUTRON RADIOGRAPHY AND TOMOGRAPHY FOR APPLIED RESEARCH ON THE BASE OF THE VVR-K REACTOR

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At the basin-type reactor on thermal neutrons VVR-K, an experimental facility is setting up to conduct researches using neutron radiography and tomography. A neutron beam with a cross section of 20 x 20 cm forms a system collimator, for which the value of the characteristic parameter L / D can vary from 350 to 2000.

INTRODUCTION

The neutron radiography method consists in obtaining neutron images of the investigated objects. Due to the different degree of attenuation of the neutron beam during the passage through materials of different chemical composition, density and thickness of the components of the investigated sample, the information on the internal structure of the materials with spatial resolution at the micron level is provided. This method of nondestructive control is characterized by a deeper penetration into the thickness of the material compared with complement x-ray introscopy method and is advantageous in studying samples with both light (for example, hydrogen or lithium) and heavy elements.

All modern and newly created neutron sources are equipped with neutron radiography and tomography facilities. Methods of neutron radiography now is widely applied for material investigations and products for nuclear technologies, paleontological and geophysical objects, unique objects of cultural heritage. It should be noted that now, much attention is also paid to unique research of physical and chemical processes in fuel cells and batteries, processes associated with the penetration of hydrogen or water into the thickness of various materials. Functional development of the invention of neutron radiography is made by neutron tomography. In this method the volumetric reconstruction of the internal structure of the investigated object is performed from a set of individual radiographic projections, i.e. for different angular positions of the sample relative to the direction of the neutron beam.

The presented work describes in detail the design and main parameters of the new experimental facility for investigations using neutron radiography and tomography, created on the 1st channel of the VVR-K reactor.

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