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Technical parameters of exploitation a cold neutron source on mesitylene beads on IBR-2 nuclear research facility

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Abstract

Cold neutrons with wavelengths over 4 Å emitted by high-current neutron sources have been employed in physical research since the 1980s. The cold-neutron flux is enhanced by using neutron moderators cooled to low temperatures. In these, neutrons are retarded when passing through different substances such as water, heavy water, ice, paraffin, beryllium, liquid hydrogen, liquid and solid methane, and various hydrocarbons. A neutron gradually loses its kinetic energy through multiple collisions with the nuclei of the moderator material.

In a modernization of IBR-2 reactor in 2006 was project of creation a cold neutron source. The source included three combine moderators around a reactor core. Moderators have a similar principle of work but different configuration of head part. The combine moderator is a different technical construction witch consist of a cold chamber (20K –100K) for getting neutrons with long wavelengths and warm chamber (in some of it a water pre-moderator) for thermal neutrons. The substance for slowing neutrons on IBR-2 cold source was choose a mezitilene on solid phase and beads form.

In the presentation will be shown steps of creation the combine moderator of the “central” direction (CM201) of IBR-2 reactor on mezitilene pellets. Calculations and choosing a different various of configuration CM 201 moderator. Technical equipment for the moderator system. Experiment on full scale model of moderator CM201. Will be shown a dependent a neutron spectrum from temperature of moderator. The results of the test exploitation combine moderator (CM202).

Poster back-up

Yes

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