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MONOCROMATIC NEUTRON BEAM PRODUCTION AT BRAZILIAN NUCLEAR RESEARCH REACTORS

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6. ABSTRACT TEXT:

Neutron properties and applications have been largely used in nuclear science & technology and other areas such as biology and medicine. The neutron become one of the most powerful microscope probe instrument, sometimes the only available tool for performing some special applications. Thermal neutrons are one of the best probes to investigate condensed matter, being derived from a variety of sources. The steady state nuclear reactors have been used for most experiments, on which the neutron diffraction technique application (NDTA) is preferred for a variety of studies, where discrete neutron beams are obtained from a polychromatic beam diffracted by a crystal installed in the spectrometer. In Brazil, two nuclear research reactors (IEA-R1 and IEN-R1) have been used for NDTA. The spectral distributions of these reactors had been derived using two crystal spectrometers installed at each main irradiation channels. The conventional-artificial and natural crystals performances were verified with aid of a multipurpose neutron diffractometer installed at IEA-R1. In complementation, the performance of natural crystal filters was studied. Experimental measurements of standard Au neutron cross sections were obtained with use of Al(111) and Ge(111) crystals coupled with a quartz filter, using the IEA-R1 crystal spectrometer. The wavelength range of the neutron beam produced was of 0,2 up to 3 angstrom. For the third IPR-R1 TRIGA Mark I Brazilian reactor was proposed an appropriate *soller* collimator system to be used with a vertical-type spectrometer placed at the core central tube, for NDTA with high neutron intensity and reasonable resolution.