بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

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بالرسالة صفحات

لم ترد بالأصـــل

Ain Shams University,
Faculty of girls, for Art,
Science and Education
Physics Department

STUDY OF SLOW NEUTRON INTERACTION WITH SOLIDS USING FIXED SCATTERING ANGLE SPECTROMETER

THESIS

Submitted for the Degree of Ph.D.in Physics

TO

Physics Department
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BY

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Abstract

Neutron transmission and reflection at a copper single crystal cut along the (200) plane were studied with the fixed-scattering angle spectrometer (FSAS) installed at the ET-RR-1 reactor. The FSAS used consists of a double synchronized rotor system whose physical parameters are given. The transmission was measured for neutron wavelengths between 0.21 and 0.47 nm at various orientations of the (200) plane with respect to the incident beam. The transmission data were analyzed using the general formula for the attenuation of thermal neutrons by an imperfect single crystal. An adapted computer program ISCANF-1 was developed in order to perform the required calculations. The calculated transmission data were found to be in good agreement with the measured ones within the statistical accuracy.

The study of the neutron filtering characteristics of Cu single crystal as a function of its physical parameters (mosaic spread, temperature, thickness) and cutting plane were given. It was found that the filtering characteristics of Cu, cut along (200) plane, is preferable than that one cut along (111) plane having the same physical parameters.

The calculations using the ISCANF-1 program show that a 3cm thick crystal cut along (200) plane cooled at liquid nitrogen temperature is sufficient for removing fast neutrons of energies higher than 1eV, while providing reasonable intensity of the transmitted thermal neutrons. Moreover, the calculations show that the distortion of the transmitted thermal neutron flux caused by the strong parasitic Bragg scattering planes can be avoided when the direction of the [200] was inclined by 1° with respect to the incident neutron beam direction.

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