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Title: Measurement of accelerator-based neutron distributions using nuclear track detectors

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Abstract: Nuclear track detectors were used to measure the longitudinal and transverse distributions of slow neutrons in a moderated neutron field as well as the longitudinal and transverse distributions of fast neutrons produced on the 0 degrees beam line of the KFUPM 350 keV ion accelerator. The neutrons were first produced from the T(d,n)He-4 reaction with a neutron energy of approximately 14 MeV and were then moderated in a cylindrical polyethylene moderator placed at the end of the 0 degrees beam line. The optimal transverse slow neutron distribution was found to be uniform within +/-4.5% at a 3 cm depth inside the moderator. The fast neutron distribution component along the moderator central axis exhibited an exponential-like drop in intensity with depth. Linearity checks of alpha and proton recoil track density with irradiation time for the nuclear track detectors were verified for both slow and fast neutrons. (C) 2000 Elsevier Science B.V. All rights reserved.