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Quality assessment of the radial and tangential NR beamlines of the TRR

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To achieve a quality neutron radiographic image in a relatively short exposure time, the neutron radiography beam must be of good quality and relatively high neutron flux. Characterization of a neutron radiography beam, such as determination of the image quality and the neutron flux, is vital for producing quality radiographic images and also provides a means to compare the quality of different neutron radiography facilities. This paper provides a characterization of the radial and tangential neutron radiography beamlines at the Tehran research reactor. This work includes determination of the facilities category according to the American Society for Testing and Materials (ASTM) standards, and also uses gold foils to determine the neutron beam flux. The radial neutron beam is a Category I neutron radiography facility, the highest possible quality level according to the ASTM. The tangential beam is a Category IV neutron radiography facility. Gold foil activation experiments show that the measured neutron flux for radial beamline with length-to-diameter ratio (L/D) = 150 is $6.1 \times 10^6 \text{ ncm}^{-2} \text{ s}^{-1}$ and for tangential beamline with (L/D) = 115 is $2.4 \times 10^4 \text{ ncm}^{-2} \text{ s}^{-1}$.

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