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Response function of a neutron dose-rate meter: unfolding evaluation and verification

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In the present work, the response function of a neutron dose rate meter (Aloka TPS-451C) has been evaluated based on the characteristics of various neutron standard fields with ^{252}Cf and $^{241}\text{Am-Be}$ sources (established in the previous works) and a self-developed unfolding code (applied the Singular Value Decomposition, SVD, approach). Measurements of neutron ambient dose equivalent rates, $H(10)^{\prime}$, have been performed when the neutron meter irradiated to various neutron standard fields with different spectra. The measured values of $H(10)^{\prime}$ and corresponding incident neutron spectra were both used as input data for determining the response function of the neutron dose rate meter applying the SVD approach. To verify the feasibility of SVD approach, it was applied to determine the response function of a well-known 8" Bonner Sphere and then compared with the published data. The result shows a good agreement between them. The SVD approach was alternatively applied for evaluating the response function of Aloka TPS-451C neutron meter which has also been compared with that obtained for the same neutron meter in other work.

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