عنوان مقاله:

Comparison and Correction of Thermo-Luminescent Responses in Different Neutron Fields

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خلاصه مقاله:

Introduction: Neutron dosimetry is a challenging subject in radiation protection. Responses of neutron dosimeters mostly depend on the neutron energy spectrum. Dosimeter response corresponding to a dose-equivalent in the calibration field is different from responses in other neutron fields. Consequently, the dose estimated by neutron dosimeters may be associated with great uncertainty. Therefore, the present study aimed to modify the response in different neutron fields in order to reduce this uncertainty. Material and Methods: Thermo-luminescent dosimeters (TLDs) are widely used to determine neutron dose-equivalent. In the present study, a set of TLD-۶۰۰ and TLD-۷۰۰ dosimeters included in a TLD card was utilized to determine the response to “fast” neutrons of ۲۴۱Am-Be,۲۵۲Cf, and ۲۳۹Pu-Be standard fields in four dose-equivalents of ۵, ۱۰, ۱۵, and ۲۰ mSv. Meanwhile, ۲۴۱Am-Be was regarded as the calibration field. Results: As evidenced by the obtained results, for equal dose-equivalents, the original responses in ۲۵۲Cf and ۲۳۹Pu-Be fields are smaller, compared to those in the ۲۴۱Am-Be filed. The maximum discrepancies were obtained at ۲۶.۸% and ۴۲.۵% occurring at ۲۰ and ۵ mSv, respectively. After the application of a correction factor equal to the average of relative responses (i.e., in ۲۴۱Am-Be to two other fields) corresponding to all dose-equivalents considered, these differences reduced to ۱۲.۴% and ۲۱.۷%. Conclusion: It can be concluded that the correction method used in the present study could enhance the accuracy of dose estimated by TLDs in fast neutron fields.

کلمات کلیدی:

Neutron, Thermoluminescence Dosimeter, Correction factor