

Abstract:

A basic requirement for all therapeutic applications of ionizing radiation is the high accuracy of delivery of the prescribed dose to the target volume of tissue healing. Each radiotherapy department must have in the quality assurance program developed methodology for testing the operational stability, which are reviewed and approved by The State Office for Nuclear Safety (SÚJB).

A part of testing the operational stability of linear accelerators is also a regular assessment and measurement of parameters of radiation field, which is done by measuring the dose profiles.

The thesis presents the results of measurement and evaluation of photon beam dose profiles of a linear accelerator, measured using the line-semiconductor detector (LDA-99SC company IBA) in the automatic water phantom under the reference conditions and their comparison with results obtained from measurement with the ionization chamber under the same terms of reference.

The advantage of using a linear detector is a semiconductor that consists of 99 individual detectors in one line at a distance of 5 mm from each other and is able to measure the radiation dose profile field in a much shorter time than using an ionization chamber, where only one detector output can measure dose point after point.

Usage of any other independent system for measuring the dose profile is, according to the SÚJB requirement, predicated on the fact, that their deviation will not be greater than 2% compared with the values measured with ionization chamber. In case that the above requirement is fulfilled, it is possible include this method to the system of the tests of the operational stability of linear accelerators for workstation of RTOK FNKV Prague.

Further processing of the measured dose profiles in the OmniPro-Accept were obtained and evaluated parameters of the radiation field (flatness, symmetry, and penumbra of the radiation field) and wedge factors used for static and dynamic wedge filters.