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Deflection control study of radiotherapy electron beams

This work presents an integral description of electron beam deflection control as required for novel radiotherapy technique based on convergent photon beam production [1,2]. Conventional radiotherapy is mainly applied by linear accelerators. Although linear accelerators provide dual (electron/photon) radiation beam modalities, both of them are intrinsically produced by a megavoltage electron current. Modern radiotherapy treatment techniques are based on suitable devices inserted or attached to conventional linear accelerators. Thus, precise control of delivered beam becomes a main key issue. Theoretical and Monte Carlo approaches were initially used for designing and optimizing device´s components. Then, dedicated instrumentation was developed for experimental verification of electron beam deflection due to the designed magnets. Both Monte Carlo simulations and experimental results support the reliability of electrodynamics models used to predict megavoltage electron beam control.

1. R. G. Figueroa, M. Valente, Physical characterization of single convergent beam teletherapy CBRT, Physics in Medicine and Biology, 60 (2015) 7191–7206
2. R. G. Figueroa, and M. Valente, Dosimetric and Breemstralung performance of a single convergent beam for teletherapy device , Physica Medica, 32,12 (2016) 1489–1494.

Keywords: Electron beam deflection; Convergent photon beam; Monte Carlo simulation.

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