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ANALYSIS OF DOSIMETRIC CHARACTERISTICS OF VIRTUAL WEDGE

A PROJECT REPORT PRESENTED BY

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Wedged beam profiles are often used in clinical radiotherapy to compensate for missing tissue and the dose gradients of adjacent beams. Conventionally, these profiles are obtained by placing a lead attenuator in the beam path. The thickness of lead increases linearly from one end of the wedge to another. Although conventional wedges are simple to implement in clinical practice, there are several limitations to obtaining wedged profiles using this approach.

With the advent of computer control, the simulation of wedge filters by moving the collimator jaws during irradiation has become possible. A non-physical wedge generates a spatial dose distribution similar to that produced by a physical wedge without a physical filter in the photon beam. Instead, an exponential fluence profile is produced via motion of one of the collimating jaws.

In this project, the dosimetric characteristics of Virtual Wedges generated by Siemens Oncor Impression Linear Accelerator were studied. Measurement of Virtual Wedge factor, Measurement of Virtual Wedge Angle, Analysis of Dose profiles of Virtual wedge and Physical wedge, Dose Measurement for water equivalent slab phantom for treatment planned with Physical wedge and treatment planned with Virtual wedge, Generation of Dose profiles for Virtual wedges from Treatment Planning System and comparing them with measured Dose profiles of Virtual wedges were studied. Research was carried for symmetric field sizes and all the photon energy levels.

The Siemens Oncor Impression Linear Accelerator (dual energy, 6 and 10 MV) was first calibrated and the Beam was calibrated for absolute dose measurements. By following the IAEA guidelines (TRS 398), Siemens protocols, PTW guidelines & protocols (for Ion chamber, Electrometer, water phantom, linear array detector) and Nucletron guidelines &

protocols (for Treatment Planning System, Data Analysis Software) research was progressed.

The data collected were analyzed by using the Nucletron Data Analysis tools. The Gamma factor was defined for measured dose profiles and generated dose profiles and were further analyzed using the Beam Data Tool in the Oncentra treatment planning system. The results obtained, were in the acceptable range and the research revealed the accuracy and the calibrated status of the Siemens Oncor Impression Linear Accelerator.