

Automated Verification of Multileaf Collimation using an EPID

Advances in linear accelerator technology have led to the emergence of conformal therapy, in which complex beam configurations are used to optimize dose distributions. In segmented conformal radiotherapy, treatment planning incorporates a large number of fields can be used to achieve the desired dose distribution. These fields are collimated using multileaf collimation (MLC) to minimize treatment and collimation fabrication times. It is necessary to verify the individual leaf position as part of any pre-treatment QA. This QA is typically done by performing a light field verification of each MLC field with an appropriately scaled superimposed template generated from the treatment planning process. This method is qualitative, time consuming and prone to human error. An alternative method is being developed, whereby an EPID is used to acquire an image of each MLC generated field prior to treatment. Automatic edge detection is performed using the Sobel algorithm with a 50% threshold. The central axis is “approximately” located by the user, and then exactly fixed using an automated Gaussian fitting method. The individual leaf positions are identified to within 2 mm of the machine input values. The Sobel algorithm is robust for a variety of collimation shapes. Results from a Siemens PRIMUS linac with a MLC and BEAMVIEW PLUS EPID are presented. Future work will focus on the implementation of this method with an algorithm to automatically locate the central axis, and perform online leaf position verification with a patient in the treatment field.