

AbstractID: 12912 Title: Automatic ionization chamber measurement points selection for IMRT point dose QA

Purpose:

This work is about a method to automatically select IC (ion-chamber) QA measurement points. As a IMRT patient specific QA method, IC measurement is used to determine the absolute dose for delivery verification and monitor units (MU) correction purposes. Because of steep dose gradients, the locations of IC measurement points are critical. Manually selecting IC measurement points is a laborious and difficult work especially for highly modulated fields. Poor IC point selections often result in unnecessary failed measurements, or even inaccurate MU corrections. We therefore have developed a new and automatic method to determine the best IC measurement points.

Methods:

The key idea of the method is to rank the possible IC measurement points according to their local dose variations, and then to pick the best points. The local dose variation for a point is defined as the dose value range inside a 1 cm diameter sphere centered by the point. A composite ranking method is developed to include the local dose variation ratio, the absolute dose value, point location in the water phantom box, spatial distances and dose value differences from other good measurement points. In this way, the best multiple IC points can be determined not only based on the goodness of single point, but also to meet other dosimetry and physical requirements between the points.

Results and conclusion:

The method was firstly implemented and verified in MATLAB. we have ported it to Pinnacle scripts combined with C program, so to make it fully automated in Pinnacle TPS. It has been routinely used in our clinic for months. The results show that this method can speed up the IC QA planning process and reduce the rate of IC QA failures.