AbstractID: 1740 Title: Optimized Delivery of DMLC IMRT for Moving, Deformable Target

Fast CT imaging techniques are capable of providing information about motion and internal organs in the human body. This information is of considerable interest in radiotherapy. It may be used for minimizing treatment toxicity and for enhancing therapy's effectiveness. Imaging techniques revealing kinetic behavior of internal organs make it is clear that these organs are susceptible to motions that not only change their positions within the body but they are also prone to deformation. DMLC IMRT delivery to such targets requires appropriate algorithms to control movements of MLC leaves. Trajectories of leaves that define motions of leaves have to deliver the right intensity profile to deforming targets and also satisfy constraints on leave maximum velocities. For cases of a priori defined target motions these trajectories can be optimized in the sense of minimizing the time of intensity delivery. For cases when target motions are not considered to be fully defined before the treatment the adaptive changes of leaves trajectories can be implemented in real time based on the current information of target motion. For real time adaptable deliveries the constraints of leave velocity limitations are incompatible with the optimality of intensity delivery and thus force the optimality of delivery to be sacrificed. In this presentation adaptable delivery of DMLC IMRT for moving, deformable targets are introduced and discussed. Numerical solutions of clinically viable examples are presented and analyzed. The a priori and real time will be compare and contrasted.