Leaf synchronization of dynamic multileaf collimators (DMLC) of intensity modulated radiotherapy is essential in delivering the dose accurately and improving "tongue-and-groove" effects. Leaf synchronization is also important in transforming a linear type leaf setting algorithm into an areal type leaf setting algorithm. In this work, we have developed a generalized leaf synchronization method using a parameterized function. The synchronization procedure constrains the active leaf pairs to produce the desired intensity profile with the minimum beam delivery time and all leaves start and finish off the leaf sequence simultaneously. The minimum beam delivery time was shown to be the global minimum for all possible leaf setting sequences including the unsynchronized ones. The parameter of the leaf synchronization function was determined from the least-square optimization of the area variations of the subfields within a leaf-setting sequence. It was found that the unsynchronized leaf trajectories have significantly larger subfield variations than the synchronized leaf trajectories. Therefore, we demonstrated that it is important and also feasible to synchronize and optimize dynamic MLC motions while still keeping the total beam delivery time minimum for IMRT delivery.

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