

In an IMRT treatment planning system, the time sequence of multileaf collimator (MLC) settings are derived from an optimal fluence map as a post-optimization process using a software module called a “leaf sequencer”. The dosimetric accuracy of the dynamic delivery depends on the functionality of the module. An IMRT verification will be inconclusive if only a point dose is validated without an independent check of the leaf sequences for each field of a patient treatment. This verification is unique to the IMRT treatment and has been done using radiographic film, electronic portal imaging device or electronic imaging system. The measurement tests both the leaf sequencer and the dynamic MLC delivery system, providing a reliable assurance of clinical IMRT treatment. However, this process is labor intensive and time consuming. In this work, we propose to separate quality assurance (QA) of the leaf sequencer from the dynamic MLC delivery system. We describe a simple computer algorithm for the verification of the leaf sequences. The software reads in the leaf sequences and simulates the motion of the MLC leaves. The generated fluence map is then compared quantitatively with the reference map from the treatment planning system. A set of pre-defined QA indices are introduced to measure the “closeness” between the computed and the reference maps. The approach has been used to validate the CORVUS and HELIOS treatment plans. The results indicate that the proposed approach is robust and suitable to support the complex IMRT QA process.