

In step-and-shoot IMRT plans, the number of field segments for each field and resulting dose distribution are strongly affected by the number of intensity levels and minimum segment size. This study evaluated the effects of minimum segment size and number of intensity level on IMRT dose distributions. Patients with H&N and prostate cancer were selected for this study. For each case, 5 through 20 intensity levels with the 1cm^2 and 2cm^2 minimum segment size were used. Dose distributions were reviewed for the coverage and the presence of hot spots. For each field, the segments outside of the target area and/or very small segments with high MUs were deleted without causing deterioration of the dose distributions. The final plans were evaluated based on dose coverage and on DVHs for the target and critical structures. For H&N, the target coverage generated using of 5, 10, 15, and 20 intensity levels with 1cm^2 minimum segment size constraint was practically the same. The use of 5 intensity levels, however, overestimated the critical structure doses. The elimination of 1cm^2 segments with high MUs outside the target area did not change the target coverage and the hot spots were reduced by 3%. The mean doses to critical structures were reduced by ~6%. Judicious choice of number of intensity levels and minimum segment size in leaf sequencing and the selective elimination of small MLC segments with small MUs can reduce the number of segments significantly without compromising the target coverage.