

AbstractID: 1431 Title: Sweeping Window Arc Therapy (SWAT)

Sweeping Window Arc Therapy (SWAT) is an approach for generating radiation therapy treatment plans that possess the modulation properties of IMRT, yet can be delivered dynamically in one arc. A treatment is represented as a sequence of leaf positions at discrete gantry angles, and optimization is performed (with leaf constraints being enforced) directly on leaf positions, eliminating the need for field segmentation. The modulation present in IMRT is mimicked by choice of initialization; optimization starts from a Sweeping Window (SW) arc treatment, which is generated by first creating the arc of apertures conformal to the PTV, and then altering that arc by artificially closing and opening those apertures (with leaves parallel to the gantry axis) as the gantry rotates. In this way any given voxel of the PTV is alternately shielded and irradiated; further, the window-sweeps can be made complementary, so as to preserve an approximate uniform dose to the PTV. Because this (artificially-induced) modulation is orthogonal to the apparent motion of the PTV caused by geometric rotation, the optimized final treatment can be expected to inherit from the SW initialization some of its modulation, while remaining deliverable at every step. The inherent mathematical simplicity of the treatment representation allows for *a priori* analytic computation of variable beam weights, as well as representation and optimization in the Fourier domain; both extensions are incorporated into the method, and their efficacy evaluated with respect to the viability of the resulting treatment plans.

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